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SCHMIDT (E. W.). **Bericht über neuere Arbeiten zur Biologie der Zuckerrübe.** [Report on recent investigations on the biology of the Sugar Beet.]—*Dtsch. Zuckerindustr.*, lx, 40, pp. 864–866; 42, pp. 901–902, 1935.

Some personal observations of the writer in connexion with a review of recent work on leaf spot (*Cercospora*) [*beticola*: *R.A.M.*, xv, p. 191], curly top [ibid., xiv, pp. 809, 813], and mosaic [ibid., xiv, p. 808] of beets are of interest. New hosts of *C. beticola* include *Chenopodium foetidum*, *C. quinoa*, *C. hybridum*, *C. vulvaria*, *C. ambrosioides*, and *C. amaranticolor* (all successfully inoculated in the field in 1935), besides another member of the Chenopodiaceae, *Hablitzia tamnoides*, from the Ural Mountains, and the wild beet, *Beta lomatogoma*, from Anatolia.

Experiments at the Kleinwanzleben Research Institute in the transmission of beet mosaic by juice inoculations gave negative results, and the suggestion is made that Verplancke's reputed success in this operation is based on an erroneous interpretation of his observations [ibid., xiv, p. 72].

MAGEE (C. J.). **Downy mildew of Beetroot. A disease new to the State.**—*Agric. Gaz. N.S.W.*, xlvi, 10, pp. 571–572, 2 figs., 1935.

An outbreak of beet downy mildew (*Peronospora schachtii*) [*R.A.M.*, xv, p. 190], apparently the first record for New South Wales, occurred in 1935 in a market garden near Sydney, approximately 25 per cent. of the crop becoming affected. There is evidence that the infection was introduced into Australia in imported seed. As beets are grown locally under irrigation it appears to be probable that significant losses will occur in New South Wales wherever the disease is introduced. Notes are given on the symptoms, economic importance, and seed-borne nature of the disease, and the paper terminates with brief recommendations for control by the use of clean seed and the avoidance of presumably infected soil.

LEACH (L. D.) & DAVEY (A. E.). **Toxicity of low concentrations of ammonia to mycelium and sclerotia of Sclerotium rolfsii.**—*Phytopathology*, xxv, 10, pp. 957–959, 1 graph, 1935.

Aqueous solutions of ammonia (50 p.p.m.) for exposures of 24 hours have been found toxic to the mycelium of *Sclerotium rolfsii*, the agent

of a serious root rot of sugar beets in California [*R.A.M.*, xv, p. 70], while by increasing the strength to 150 p.p.m. the necessary period of contact was reduced to two hours. The minimum concentrations required to destroy the more resistant sclerotia within periods of 24 and 72 hours were, respectively, 250 and 150 p.p.m. of ammonia. Formaldehyde at equivalent concentrations took longer to kill the mycelium and sclerotia of *S. rolfsii* than ammonia in these tests. In field trials, either anhydrous ammonia or ammonium sulphate [cf. *R.A.M.*, xiii, p. 639], dissolved in irrigation water in concentrations of about 300 p.p.m. of ammonia, significantly reduced the percentage of root rot in sugar beets, the increased yield of which (9 as compared with 5 tons per acre) more than sufficed to cover the cost of the treatments.

DAVEY (A. E.) & LEACH (L. D.). **Toxicity of compounds of ammonia to Sclerotium rolfsii.**—Abs. in *Phytopathology*, xxv, 9, pp. 895–896, 1935.

Laboratory experiments were carried out to ascertain the reason for the proved beneficial effect of ammonium sulphate in the reduction of losses among sugar beets in soils of P_H 7 to 7·9 from *Sclerotium rolfsii* [see preceding abstract]. It was found that solutions containing 41·2 millimols of ammonia as ammonium sulphate per litre and saturated with calcium carbonate, giving a P_H of 7·8, were toxic to the mycelium in five days. Solutions of ammonium bicarbonate and dibasic ammonium phosphate at P_H 7·5 and respective concentrations of 17·8 and 14·7 millimols of ammonia were also lethal in the same period to immersed mycelium. These data are considered to suggest that ammonia, applied to the soil as solutions of anhydrous ammonia or ammonium salts, may be the effective agent, at a sufficiently high P_H value, in the reduction of sclerotial infection by inhibiting the development of the fungus.

CAMPBELL (L.). **Downy mildew of Peas caused by Peronospora pisi (De B.) Syd.**—*Bull. Wash. St. agric. Exp. Sta.* 318, 42 pp., 7 figs., 1 graph, 1935.

This is a tabulated account of the author's investigation in Washington State of downy mildew of peas, the causal organism of which is commonly referred to as *Peronospora viciae* [*R.A.M.*, xii, p. 340]. The pea fungus, however, was not observed to occur naturally on species of *Vicia* growing in infected pea fields and failed to infect them and a number of other legumes under experimental conditions; furthermore the only downy mildew occurring naturally on a local vetch (*V. gigantea*) was shown to differ from the pea fungus both morphologically and in its pathogenicity, while both differed morphologically from specimens of *P. viciae* received from Sydow in Europe. The author, therefore, accepts for the pea organism Sydow's binomial of *P. pisi*, the American fungus agreeing with his description of this species, except that the conidiophores of the former measure 300 to 1,300 μ instead of 250 to 450 μ. An emended English description is given to include the oospores, which were not found by Sydow but occurred abundantly in systemically infected plants; they are greenish-yellow, reticulate, and 26 to 43 μ in diameter, the areolae being 8 to 12 μ in

diameter. The fungus on *V. gigantea* is considered to be new to science, and is named *P. vicicola* [with an English diagnosis]; it differs from other species of *Peronospora* on *Vicia* in its oospores, which are bright brown, 27 to 44 μ, with areolae 1 to 1·5 μ in diameter. Like *P. pisi*, *P. vicicola* was shown experimentally to be strictly specialized as a parasite to its own host.

In addition to causing local infections on the pea leaves, stipules, and pods [ibid., xi, p. 75], occasionally *P. pisi* may infect the host systemically, in which case either a portion or the entire plant is dwarfed, often rosetted and porcellaneous in character, while the entire lower surface of the leaves and often other parts also may be covered with a downy mycelium. When the entire pod of such plants is not involved, infection is restricted to the proximal end; infected pods usually show a proliferation of the endocarp.

Field observations and greenhouse experiments showed that soil contaminated with the oospores of the fungus is a common source of primary infection, but that in new areas the disease may be introduced with pea seed carrying the pathogen in the seed coat. Wind and splashing rain are two important agents of conidial dissemination, but there was evidence that the conidia are not viable if blown to any great distance, since they are killed by 15 minutes' desiccation. Other tests showed that infection results when the host plants retain free moisture on their surface for four hours but not for two hours, and that its development is favoured by temperatures from 32° to 70° F. For the control of the disease in regions where climatic conditions are conducive to the fungus, crop rotation is recommended, as well as the use for sowing of seed originating from arid areas, since hot air or hot water treatment of the seed was not effective or severely injured the seed. Limited greenhouse tests, where the time of inoculation could be controlled, indicated that Bordeaux-penetrol [ibid., xiii, p. 315] mixture affords good protection against conidial infection, if the plants are sprayed before inoculation.

Observations in the coastal areas of Washington in 1933 and 1934 showed practically 100 per cent. infection of the pea fields with downy mildew by the time the plants had reached the blossom stage, pod infections being occasionally as high as 35 to 40 per cent. All the local varieties of peas tested were found to be equally susceptible to the disease.

PRICE (W. C.). **Classification of southern Celery-mosaic virus.**—*Phytopathology*, xxv, 10, pp. 947–954, 4 figs., 1935.

The inoculation by rubbing of *Zinnia elegans* (Golden Gem Midget) with the southern celery mosaic virus (celery virus 1) [*R.A.M.*, xv, p. 191] was found to induce in the test plants specific immunity from a subsequent infection by a yellow strain (6) of the cucumber mosaic, agreeing in this behaviour with other strains of cucumber mosaic [ibid., xiv, p. 813]. Southern celery mosaic and cucumber mosaic, therefore, are closely related immunologically and should, it is believed, be classified as strains of the same virus. The southern celery mosaic virus appears to be more infectious than ordinary cucumber mosaic, a fact that may explain its wider host range, higher thermal death

point, and greater resistance to ageing *in vitro*. Corroborative evidence for this hypothesis is further afforded by the similarity of the symptoms induced by the celery and cucumber mosaic viruses in maize, *Commelina communis* (both heretofore regarded as immune from the latter), and cowpea (hitherto considered to be immune from the former). These data are thought to exemplify the utility of immunological reactions for the purpose of elucidating plant virus relationships.

BROWN (W.). **On the Botrytis disease of Lettuce, with special reference to its control.**—*J. Pomol.*, xiii, 3, pp. 247–259, 1935.

After briefly referring to Abdel-Salam's investigations on the disease of lettuce caused by *Botrytis cinerea* in England [*R.A.M.*, xiii, p. 559], the author gives a tabulated account of his own experiments on its control. In 1934 he found that, while steeping the lettuce seedlings raised in cold frames in a 0·5 per cent. uspulun or nu-green solution before transplantation in the field gave appreciable control [loc. cit.], this method involves risk to the plants. Five minutes' immersion in a 1 in 1,000 mercuric chloride solution plus potassium iodide gave as good control of the fungus as 25 minutes in mercuric chloride alone, but the damaging effect on the plants ran in a like direction. Tests were also made of a non-mercurial dust 'brassisan' (the effective constituent of which is a chloronitrobenzene preparation), which other work in progress had shown to combine efficacy against club root [*Plasmodiophora brassicae*] and damping-off of *Brassica* spp. with innocuousness to the plants; a single dusting of the collars of the lettuce seedlings, the roots of which were protected against the dust, raised the average percentage of the survivors in the field to 73, as against 27·5 of the controls.

During the 1934–5 season the tests were continued in two series, in one of which lettuce was sown in cold frames in the middle of October, and the other in the middle of November, the treated frames receiving one or two applications of brassisan during growth. The seedlings were transplanted in March 1935, either without further treatment, or were dusted after preliminary spraying (which increases the efficacy of the dust) a few hours beforehand. The results indicated that the seedlings from the early sown, undusted frames averaged only 150 in number and gave a negligible survival percentage in the field, which, however, was raised approximately to 50 per cent. by the single dusting at the time of transplantation. The seedlings from the early sown frames dusted once only, though considerably more numerous (790), were similar in quality to those from the undusted frames. The number of seedlings in the early sown, twice dusted frame was comparable to that in the once dusted (675), but the seedlings gave a much higher survival, which was slightly raised by the pre-transplantation dusting, when planted without further treatment. The seedlings from the late-sown, undusted frames averaged 1,720 in number and those from the once and twice dusted 6,810 and 8,270, respectively; the survival of plants from the undusted frames was always considerably lower than that of the twice dusted, both being planted without further treatment. The average percentage of late-sown seedlings showing *B. cinerea* stem lesions was 34 in the controls, as against 3 and 2·2,

Illinois varieties) in southern Illinois in 1935 by downy mildew (*Peronospora manshurica*) [*R.A.M.*, xiii, p. 656], first recorded in the State in 1929, the fungus destroying on an average some 10 per cent. of the leaf area and sometimes attacking every plant in a field. The incidence of infection was probably increased by the heavy mid-June rainfall.

Nicol (H.). **Mushroom cultivation without stable manure.**—*Gdnrs' Chron.*, xcviii, 2546, p. 270, 1935.

The valuable use of adco in the production of artificial farmyard manure for the cultivation of edible mushrooms [*Psalliota campestris* and *P. arvensis*: *R.A.M.*, xiv, p. 555] is briefly indicated. A special form of the preparation suitable for this purpose is stated to be now on the market.

Luthra (J. C.), Sattar (A.), & Bedi (K. S.). **Life-history of Gram blight [Ascochyta rabiei (Pass.) Lab. = Phyllosticta rabiei (Pass.) Trot. on Gram (Cicer arietinum L.)] and its control in the Punjab.**—*Agric. Live-Stk India*, v, 5, pp. 489–498, 2 pl., 1 map, 1935.

This is a popular account of the work done up to date in the investigation of gram (*Cicer arietinum*) blight (*Ascochyta rabiei*) in the Punjab, much of which has already been noticed in this *Review* from other sources [*R.A.M.*, xii, p. 264; xiii, pp. 346, 611]. The additional points of interest which may be noticed are as follows. It was definitely established that infected gram material remaining in the field from one crop is an important source of primary infection for the next, experiments having shown that *A. rabiei* remains alive for more than two years in such material, unless it is buried at least two inches deep in the soil, when the fungus is killed in a month provided sufficient soil moisture is present. Usually primary infection foci in a field are limited and isolated, but in windy and wet early seasons the infection is rapidly spread by rain and also by the distribution over the field of infected debris, apt to be broken off from the brittle diseased plants and transported for hundreds of yards by strong winds. It was also conclusively shown that soil infection with the fungus does not play any part in the perpetuation of the disease. The minimum temperature for growth and spore germination was below 10°, the optimum 20°, and the maximum about 32·5° C. Very few spores germinate and cause infection during December and January, due to the very low temperatures which prevail at that time; infection usually occurs in February and March, when temperature rises to 70° or 80° F.

For purposes of control it is recommended that infected gram plants should be removed from the fields at harvest time or ploughed under during summer, at least two or three months before sowing the new crop. Infected straw may be safely fed to cattle, as the spores were shown not to survive passage through the animals. Seed should be obtained from regions where the disease does not occur. Observations made during several years indicated that gram sown in mixture with wheat, barley, taramira (*Eruca sativa*), sarson (*Brassica campestris*) [var. *sarson*], or any other suitable crop suffers less from the disease than pure stands, and this measure is also recommended wherever possible to minimize the losses caused by blight.

RIVES (L.). **Hybrides et court-noué.** [Hybrids and court-noué.]—*Progr. agric. vitic.*, civ, 33, pp. 159–162, 1935.

After briefly referring to his previous communications on the pathological condition of the vine in two vineyards in the department of Var, now believed to be due to adverse soil conditions in association with the endophytic mycorrhizal fungus [court-noué: *R.A.M.*, iii, p. 501] and bacteria [ibid., ix, p. 504], the author states that Jacquez hybrid vinestocks which were planted some seven or eight years earlier in the worst diseased parts of the estates have remained strikingly healthy in the midst of badly stunted and misshapen stocks of *Vitis vinifera*, either on their own roots or grafted. The examination of their roots showed a very slight invasion of the root system by the mycorrhizal fungus, which was very abundant in the cortical tissues of the roots of the diseased stocks. A high degree of resistance to the trouble was also exhibited by the hybrids Couderc 13 and S. 5813; both of which, like Jacquez, have a very hard and dense wood. These observations indicate that under environmental conditions similar to those that prevail in the estates, court-noué may be controlled by planting resistant hybrids on Jacquez stocks, promising results having been obtained with various *vinifera* grafts.

D. H. **Résultats d'un traitement du court-noué.** [The results of a treatment of court-noué.]—*Progr. agric. vitic.*, civ, 40, pp. 328–329, 1935.

Some 50 ares [rather more than 1 acre] of 4986×3309 vines very severely affected with court-noué [*R.A.M.*, xiv, p. 616 and preceding abstract] were treated with zinc sulphate, 250 gm. to each vine [ibid., xiv, p. 347], as well as with various fertilizers, while the land was also drained and the vines sprayed with pyralesca. Practically all the vines made a very satisfactory recovery from the disease.

BERGER (G.) & BOUHELIER (R.). **Les principales maladies de la Vigne en Chaouïa au cours de l'année 1934.** [The chief Vine diseases in Shawia during 1934.]—*Progr. agric. vitic.*, civ, 40, pp. 329–333, 1935.

Esca disease of the vine (attributed, on account of the yellow mycelium present, to *Polyporus* [*Fomes*] *igniarius*) [*R.A.M.*, x, p. 774; cf. also xii, p. 486] is stated to have been observed for the first time in the vicinity of Casablanca, Morocco, in August 1934. The affected plants showed a drying-up of the leaves with an internal necrosis of the stem which extended to the old pruning wounds. The damage caused, though not great, was appreciable.

L[ARUE] (P.). **La maladie de la moelle en Autriche.** [The pith disease in Austria.]—*Progr. agric. vitic.*, civ, 41, pp. 354–356, 1935.

In a recent communication to the periodical *Weinland*, [*1935*, 5–6, 9 pp.], which is briefly summarized in this paper, Zweigelt and Voboril state that the pith disease of the vine [*R.A.M.*, xiv, p. 675] has been found to occur throughout Lower Austria, as well as in Jugo-Slavia and the Burgenland abutting on Hungary; it has not been recorded either

in Styria or Germany. In young vine plants, the pith of which has been destroyed entirely, adventitious roots are produced at the crown node at soil-level. In the host the disease may spread either upwards or downwards, and both healthy and diseased shoots may be present on the same vinestock. A feature of diagnostic value is that while in pruning stubs which die naturally the wood is light brown with a narrow and yellow pith, in stubs killed by the disease the wood is dark brown and the pith dark and enlarged. Other symptoms which differentiate the pith disease from similar diseases are concisely indicated.

Infection of vinestocks frequently originates at the graft, and the attention of Austrian vine-growers is called to the proper method of cutting grafts, since cutting them at the upper end too close to a node weakens the natural resistance of the nodal diaphragm to penetration by fungi. The note terminates with a brief indication of the control experiments now in progress.

Faes [H.] & Staehelin [M.]. **Le coître de la Vigne (Coniothyrium diplodiella).** ['Coître' of the Vine (*Coniothyrium diplodiella*).]—*Terre vaud.*, *1935*, pp. 133, 154, 172, 193, 1935. [Abs. in *Neuheiten PflSch.*, xxviii, 6, pp. 170–171, 1935.]

The agent of the 'coître' (white rot) of the vine (*Coniothyrium diplodiella*), first observed in Italy in 1878, is stated to be responsible for enormous losses among the highly susceptible Gutedel stands in districts of French Switzerland liable to be visited by severe hailstorms [*R.A.M.*, xiii, p. 351]. The accumulation of spores in the soil only occurs in regions subject to hailstorms, and inoculation experiments with soil from the Canton of Valais, where hail is almost unknown, gave negative results. Soil sterilization with formalin or acetic acid is effective at the rate of 10 l. per sq. m., but is too expensive for practical purposes. In order to permit of infection by *C. diplodiella*, the sugar content of the grapes must reach a certain minimum and the sugar-acidity ratio must be favourable; hence the virtual absence of coître, even in the presence of hail, immediately after flowering and shortly before maturity. Some degree of control may be achieved by prompt removal of the hail-struck fruits [ibid., xi, p. 692], while protective substances, such as soda, calcined magnesia, or borax to induce alkalinity, and drying substances (e.g., certain kinds of cement) to retard spore germination, or mixtures of both groups, should be applied within 16 hours to prevent penetration by the germ-tubes.

Săvulescu (T.) & Rayss (T.). **Les espèces de Cercospora parasites des feuilles de Vigne en Palestine.** [The species of *Cercospora* parasitic on Vine leaves in Palestine.]—*Rev. Path. vég.*, xxii, 3, pp. 222–241, 6 pl., 1935.

Notes are given on six species of *Cercospora* found on vine leaves, viz., *C. leoni* n.sp., *C. coryneoides* n.sp. [both with Latin diagnoses], *C. vitiphylla*, *C. roesleri* [*R.A.M.*, ix, p. 504; xiii, p. 617], all from Palestine, *C. vitis* (syn. *C. viticola*) [ibid., ix, pp. 505, 613] recorded from most viticultural regions, and *C. sessilis* from the Caucasus.

C. leoni produces scattered, angular, irregular spots 1 to 3 mm. wide on both leaf surfaces, olive-brown on the under one. The rigid, brownish,

non-septate conidiophores measure 15 to 35 by 4 to 6 μ and are arranged in fascicles 45 to 135 μ in diameter by 60 to 75 μ high, with a tubercular, stromatic, colourless subiculum. The vermiculate, straight or curved, olivaceous, solitary, continuous, later 1- to 2-, occasionally 3-septate, conidia measure 18 to 40 by 6·5 to 7 μ.

C. coryneoides produces scattered, angular, irregular, dark brown spots 0·5 to 1 mm. wide on both leaf surfaces; they frequently coalesce, covering a large area, especially on the lower surface. The fascicle of conidiophores measures 90 to 135 by 60 to 90 μ, and has a tubercular, sclerotic, spherical or elongated, blackish-brown subiculum at the base measuring 54 to 90 by 60 to 90 μ. The sinuous, septate conidiophores, dark brown at the base, lighter towards the apex, measure 30 to 110 by 4 to 6 μ. The straight or curved, olivaceous, solitary 3- to 5-septate conidia are constricted at the septa and measure 30 to 48 by 4 to 7 μ.

SĂVULESCU (T.), SANDU-VILLE (C.), RAYSS (T.), & ALEXANDRI (V.). **L'état phytosanitaire en Roumanie au cours de l'année 1933–34.** [Phytosanitary conditions in Rumania during the year 1933–1934.] —*Inst. Cerc. Agron. al României*, 24, 59 pp., 7 figs., 1935. [Rumanian, with French translation.]

In the autumn of 1933 rust (*Puccinia* spp.) infection of winter wheat was insignificant in Rumania, and in the following spring, owing to exceptionally dry weather conditions, it was less serious than in previous years. The first attack of *P. triticina* was noted on 26th April, and at the end of June, following a rainy period, a severe outbreak occurred on wheat showing retarded vegetation, particularly on spring varieties [*R.A.M.*, xiv, p. 214]. Heavy losses were caused by loose smut of wheat (*Ustilago tritici*), and Cipăianu 714 wheat was very severely attacked by *Septoria tritici* [ibid., xiii, p. 434]. *Fusarium nivale* [*Calonectria graminicola*: ibid., xiii, p. 521] reduced the wheat yield in one field by 80 per cent.; the attack occurred on plots sown in early autumn and in which the wheat had made good growth, but wheat sown after 15th September remained unaffected. *Helminthosporium turcicum* [ibid., xiv, p. 685], first recorded in Rumania in 1933, caused severe infection of maize in several localities and also occurred on sorghum near Bucarest. Foot rot of barley was caused by *F. culmorum* [ibid., xiii, p. 623].

Attention is drawn to the important part played by self-sown plants in the dissemination of most of the above-mentioned fungi, which live over on volunteer plants until the winter cereal crops appear. Cereal rust spores fall on the ground before and during harvest, remain alive on the stubble, and pass on to self-sown plants, where they produce new spores which in turn infect the young winter wheat. The severity of the autumn infection of cereal rusts depends on the date of sowing and the meteorological conditions, and owing to favourable weather in the autumn of 1934, severe infection was general throughout Rumania. *Leptosphaeria tritici* [ibid., viii, p. 290] is transmitted to wheat in autumn from self-sown plants, as is *L. passerinii* to barley; both cause a yellow discoloration of the leaves. *Erysiphe graminis*, commonly present on wheat and barley leaves, spreads during summer from self-sown plants to autumn crops.

Sunflowers were severely infected by *P. helianthi* [ibid., xiv, p. 747], and soy-beans showed the presence of mosaic [ibid., xi, p. 424; xiv, p. 82]. The virus disease of eggplants previously reported [ibid., xiv, p. 215] was again very prevalent, largely owing to heavy insect infestation; 50 to 60 per cent. of the plants in the hotbeds in market-gardens in one area were rendered unsaleable by the disease, and occasionally affected plants completely dried up.

Rose powdery mildew [*Sphaerotheca pannosa*: ibid., xiv, p. 711] was widely present, though resistance was shown by the Willoomer and New Dawn varieties. *Sclerotinia libertiana* [*S. sclerotiorum*] attacked rosebuds; the flower receptacles and the peduncles turned black, the buds withered, and the flowers failed to open. Rose black spot (*Diplocarpon rosae*) [ibid., xiii, p. 771; xiv, p. 382] was more serious than usual.

Apple bark necrosis (*Dermatea corticola*) [see below, p. 260] was frequently associated with *Sphaeropsis malorum* (*Physalospora cydoniae*) [*P. obtusa*: ibid., xv, p. 31]. In one apple orchard, 60 to 70 per cent. of the fruits were affected by glassiness [ibid., xiii, p. 316], a physiological condition apparently due to atmospheric humidity and excessive growth.

A severe outbreak of vine *Oidium* (*Uncinula necator*) was reported from one locality, while in some districts losses (which in one case reached 50 per cent.) were caused to vines by *Rosellinia necatrix* [cf. ibid., xi, pp. 24, 765]. Much damage was done to the grape berries by widespread infection by *Botrytis cinerea* and *Charrinia diplodiella* [ibid., iv, p. 460].

MARTYN (E. B.). **Report of the Botanical and Mycological Division for the year 1934.**—*Div. Rep. Dep. Agric. Brit. Guiana, 1934*, pp. 105–108, 1935.

During the period under review, a further outbreak of citrus scab [*Sporotrichum citri*: *R.A.M.*, xiv, p. 218] occurred in a citrus nursery at Hosororo. A grower in the Pomeroon district of British Guiana reported that several of his coco-nut trees which had appeared to be dying from wilt [attributed to physiological causes: *R.A.M.*, xi, p. 26] recovered as a result of burning off all but the heart leaves. The success of this treatment has also been reported on one or two other occasions.

In a search for individual cacao trees showing resistance to witches' broom (*Marasmius perniciosus*) [ibid., xv, p. 76] the few apparently healthy trees selected were later found to be diseased. Some wild cacao in the Ranaku Mountains is stated to be free from the disease, but it is thought probable it would succumb if grown in an infected region.

Pineapples were attacked by 'black eye' disease [ibid., xv, p. 137] on the new Pineapple Company's estate, where a number of the plants also developed symptoms entirely similar to those of the wilt reported from the West Indies by Nowell and Stockdale.

Guava suffered from sun crack of the fruits, a condition which usually affects a certain percentage of ripening fruit, particularly when a wet spell is followed by several dry, sunny days; the fruits split open, but are still suitable for culinary purposes.

SHEPHERD (E. F. S.). **Botanical and Mycological Division.**—*Rep. Dep. Agric. Mauritius, 1934*, pp. 19–21, 1935.

In tests of sugar-cane varieties in Mauritius during 1934 for resistance to gumming disease (*Bacterium vascularum*) [*R.A.M.*, xiii, p. 494] a number were found to be sufficiently resistant to warrant further propagation.

Tobacco black shank (*Phytophthora parasitica*) [loc. cit.] was fairly widespread during the warmer months of the year. In resistance trials one strain of Amarello was much less susceptible than the other varieties tested, and selections are to be made from it for further trials; the Constant, Blue, and two Florida varieties were highly resistant. Serious outbreaks of tobacco mosaic [ibid., viii, p. 73] occurred on two estates in the Black River district.

Experimental evidence indicated that spraying with sulphemulsol [ibid., xiii, p. 522] may prove of use against dry side rot of pineapple fruits [ibid., xiv, p. 84]. A few cases of pineapple stem bleeding and top rot associated with *Ceratostomella paradoxa* [ibid., xiv, p. 455] occurred in one locality; the top rot appeared to be secondary to the stem disease.

Potato bacterial wilt (*Bacterium solanacearum*) [ibid., xv, p. 111] was present in several districts. Many potato consignments from abroad were infected with powdery scab (*Spongospora subterranea*) [ibid., xiv, p. 330], but when planted, the infected tubers gave a healthy crop, the climatic conditions prevailing in Mauritius apparently acting as a deterrent to the disease.

New records included powdery mildew of potato (*Oidium* sp.) [cf. ibid., xiv, p. 83] and a collar rot of young papaw (*Carica papaya*) associated with and probably caused by a *Phytophthora* [ibid., xiv, p. 216].

STOREY (H. H.). **Report of the Plant Pathologist.**—*Rep. E. Afr. agric. Res. Sta. 1934–35*, pp. 12–16, 1935.

A study of the mechanism of the process by which *Cicadulina mbila* inoculates maize with streak [*R.A.M.*, xiv, p. 146] showed that the virus is transmitted through the stylets which must penetrate to the phloem for successful inoculation. The transfer of the virus in the saliva appears to be the only tenable hypothesis, but the outcome of experiments on the subject was to leave the function of the saliva in doubt. The inoculative ability of the insects was found to vary greatly; all pure, active individuals transmitted the virus if allowed prolonged contacts with diseased and healthy plants successively, but showed marked differences in their ability both to inoculate plants successfully during short contacts and to remain infective after a single contact with the source of the virus. A normally active, fertile line of *C. zeae* was infertile when crossed with a pure, inactive line, but as minute morphological differences were noted between the two lines, *C. zeae* may possibly be a group of closely similar species.

Of four cassava varieties received from the Gold Coast, immune from or highly resistant to mosaic [ibid., xiv, p. 428; xv, p. 76] in their country of origin, the two so far tested in East Africa, 'Calabar' and

The special part gives a more or less complete account of all the bacterial diseases hitherto recorded, arranged according to the host plants under the headings: cryptogams, conifers, monocotyledons, and dicotyledons. It also contains a comparative table of the morphological and biochemical characters of the plant parasitic organisms, and some supplementary information concerning the newest methods of staining.

Apart from numerous references to literature given in the form of footnotes, the bibliography appended at the end of the volume comprises 1,734 titles, and the book terminates with a full index of all the bacterial organisms mentioned in the work, and another one of their plant hosts.

STAPP (C.). **Contemporary understanding of bacterial plant-diseases and their causal organisms.**—*Bot. Rev.*, i, pp. 405–425, 1935.

This is a short review of the progress attained since the beginning of this century in the study of bacterial diseases of plants and of their causal organisms, the elucidation of the true status of many of which has been a feature of the more recent investigations. Serological tests (comprising agglutination and especially precipitation reactions) are regarded as most important in establishing the identity of species, and, when positive, are to be relied on even though there be definite cultural or physiological differences. The bibliography appended at the end includes 130 titles.

KOSTOFF (D.). **Heritable tumours in plants experimentally produced.**—*Genetica*, xvii, 3–4, pp. 367–376, 3 figs., 1935.

The non-parasitic tumours resulting from the mutual activity of the maternal and paternal contributions in species hybrids of *Nicotiana* [*R.A.M.*, xiii, p. 498], e.g. *N. rustica* × *N. cavanilesii*, *N. paniculata* × *N. langsdorffii*, *N. glauca* × *N. langsdorffii* and the reciprocal cross, were shown to develop quite independently of the chromosome numbers in the parental plants. As a rule the excrescences, which first appear on the roots, then on the stems (the largest near the ground), and rarely affect the leaves, possess the same number of chromosomes as the hybrid, but portions of the tumours may have a doubled or an altered chromosome complement. Similar tumours or fasciations to the foregoing were also formed in back-crosses between (*N. glauca* × *N. langsdorffii*) and *N. langsdorffii*, the progeny of which were mostly triploid, and on the amphidiploids produced by intercrossing *N. glauca* and *N. langsdorffii*; the fertile hybrids of these two species not only form tumours but also transmit this character to their progeny. Here again the chromosome number of the tumours generally agreed with that of the plants bearing them, but there were various aberrations comparable with those found in human cancer, the implications of which are discussed [ibid., xv, p. 139, and next abstract].

RIKER (A. J.) & BERGE (T. O.). **Atypical and pathological multiplication of cells approached through studies of crown gall.**—*Amer. J. Cancer*, xxv, 2, pp. 310–357, 3 figs., 1935.

In this paper the authors give a comprehensive critical review of the work done up to date in the investigation of crown gall (*Phytomonas*

[*Bacterium*] *tumefaciens*) [*R.A.M.*, xv, p. 5], the apple hairy-root organism (*P.* [*Bact.*] *rhizogenes*) [ibid., xiv, p. 452], and related plant diseases, in which the hyperplastic and hypertrophic growth of the host tissues is comparable with atypical and pathological cell proliferation in man and animals [cf. preceding abstract]. In their opinion the data collected indicate that studies with plant materials offer an excellent opportunity for clarifying many basic questions relating to this process in higher animals, both because of the experimental advantages presented by them, and because of the probability that a fundamental contribution towards establishing the cause of cell stimulation in one field may clarify the general problem of cancer and related diseases.

A bibliography comprising nearly 200 titles is appended.

Boivin (A.), Marbe (M.), Mesrobeanu (Lydia), & Juster (P.). **Sur l'existence, dans le Bacillus tumefaciens, d'une endotoxine capable de provoquer la formation de tumeurs chez les végétaux.** [On the existence in *Bacillus tumefaciens* of an endotoxin capable of inducing tumour formation in plants.]—*C. R. Acad. Sci., Paris*, cci, 21, pp. 984–986, 1935.

A specific glucido-lipidic complex, representing at once the complete somatic antigen and the principal endotoxic constituent, was isolated from *Bacillus* [*Bacterium*] *tumefaciens* [see preceding and next abstracts] by a treatment with trichloracetic acid involving coagulation of the microbial proteins and diffusion of the substance in question from the dead organism. The toxicity of the complex to mice proved to be of a very mild order as compared with that of similar extracts from organisms of the *Eberthella* group. Repeatedly injected into rabbits the *Bact. tumefaciens* antigen induced the development of precipitins in the blood-stream. Tumours closely resembling those caused by inoculation with the living organism were formed after a month on Grand Soleil sunflower stems into which the antigen was injected, the number of positive cases being 30 out of 36 for inoculation with the living organism and 28 out of 36 for the antigen, while two further lots of 36 plants inoculated, respectively, with physiologic serum and the antigenic extracts of other bacilli developed no outgrowths.

Magrou (J.). **Immunité et hypersensibilité du Pelargonium vis-à-vis des réinfections par le Bacterium tumefaciens.** [The immunity and hypersensibility of the *Pelargonium* in respect of reinfections by *Bacterium tumefaciens*.]—*C. R. Acad. Sci., Paris*, cci, 21, pp. 986–988, 1935.

In a series of reinoculation experiments on 1st May, 1935, with a 48-hour-old culture of *Bacterium tumefaciens* on the stems of nine *Pelargonium* plants bearing voluminous excrescences resulting from previous infections three to four months earlier, only 25 out of a total of 285 needle-pricks gave positive results, the new tumours developing at an average distance of 14 cm. from the original ones [*R.A.M.*, viii, p. 116]. In seven control plants inoculated for the first time only 16 out of 126 pricks failed to cause neoplasms. The partial or total

immunity of the reinoculated plants was accompanied, however, by various localized or general symptoms of hypersensibility, such as internodal swellings, epidermal rupture, fusiform fissures, necrosis, or wilting. This hypersensitive condition is regarded as comparable to the pathological processes coinciding with the lysis of a given antigen on reinfection by the antibodies formed in human subjects at the first inoculation.

Die Getreideroste. [The cereal rusts.]—*Flugbl. biol. Reichsanst., Berl.*, 138–139, 4 pp., 1 col. pl., 1935.

Semi popular notes are given on the life-history and economic importance of cereal rusts in general and the symptomatology, biology, and control of yellow rust of wheat, rye, and barley (*Puccinia glumarum*), brown rust of wheat (*P. triticina*), rye (*P. secalina*), and barley (*P. simplex*) [*P. anomala*], black rust of wheat, rye, barley, and oats (*P. graminis*), brown rust of oats (*P. coronifera*) [*P. lolii*], and maize rust (*P. sorghi*) [*P. maydis*], with special reference to German conditions. The annual loss caused by cereal rusts in Germany is estimated at not less than RM. 200,000,000 [*R.A.M.*, xiv, p. 461].

Petit (A.). **Les maladies cryptogamiques du Blé.** [The cryptogamic diseases of Wheat.]—*Ann. Serv. bot. Tunis*, xi, pp. 195–234, 4 pl., 1935.

In this paper the author gives a brief, semi-popular account of the morphology, biology, and control of the more important fungal diseases of wheat in Tunis, much of which has already been noticed in this *Review* from other sources [*R.A.M.*, xii, pp. 151, 153, 271; xiii, p. 360; xiv, p. 572]. The parasites are roughly divided into those that attack the roots and collar, the aerial organs, and those that infect the whole wheat plant. Some notes are also given on fungal diseases of secondary economic importance.

Petit (A.). **Remarques sur la toxicité des anticryptogamiques pour les parasites de Blé.** [Notes on the toxicity of fungicides for the control of Wheat parasites.]—*Ann. Serv. bot. Tunis*, xi, pp. 235–263, 1935.

A detailed account is given in this paper of the relative fungicidal values, largely determined by empirical tests in Tunis [see preceding and next abstracts], of various chemical compounds and mixtures in the control of fungal diseases of wheat and other cereals, and more particularly of wheat bunt (*Tilletia* spp.) [*T. caries* and *T. foetens*], covered smut of barley (*Ustilago hordei*), loose smut of oats (*U. avenae*), and foot rot (*Cercosporella herpotrichoides*) [*R.A.M.*, xiii, p. 690; xv, p. 145]. Discussions are also given of the value of these preparations for preserving the seed-grain treated with them from insect attack, and of their action on the germinability and growth vigour of the treated grain. The paper terminates with a short note on the toxicity of certain reducing substances (sulphur, calcium cyanamide, polyoxymethylene) to rust (*Puccinia* spp.) spores.

PETIT (A.). **Le traitement des caryopses des céréales. Le soufre et le soufre cuprique.** [The treatment of cereal seed. Sulphur and cupric sulphur.]—*Ann. Serv. bot. Tunis*, xi, pp. 267–272, 1935.

The main feature of interest in this note is a table showing the results obtained in Tunis in 1934 and 1935 in the control of wheat bunt (*Tilletia levis*) [*T. foetens*], flag smut of wheat (*Urocystis tritici*), barley covered smut (*Ustilago hordei*), and loose smut of oats (*U. avenae*) by treating the seed-grain with 40 dusts, comprising a number of chemicals and proprietary preparations. These results entirely confirmed those reported in 1932 [*R.A.M.*, xii, p. 153] in regard to wheat bunt, and showed further that cuprous chloride may be mixed with sulphur dust; the mixture thus obtained (containing 25 per cent. cuprous chloride by weight) may be kept for a long time with no reduction in fungicidal value. The efficacy of copper carbonate may be considerably increased by mixing it with a homogeneous, finely divided carrier. Mercuric iodide dust (7 per cent.) was also efficacious. Wheat flag smut responded, generally, in the same way to the same compounds, but anhydrous copper sulphate was slightly less effective against it. *U. hordei* was completely controlled by dusting the seed-grain with the sulphur-cuprous chloride mixture; *U. avenae* is resistant to sulphur dusting of oat seed-grain, but is controlled by dusts containing either mercuric iodide, anhydrous copper sulphate, or neutral copper acetate.

BRÜCKNER (G.). **Brandiger Weizen als Wertminderer des Mahlgutes.** [Smutted Wheat as a factor in the reduced value of grist.]—*Z. ges. Getreidew.*, xxii, 11, pp. 218–222, 8 figs., 1935.

A semi-popular account is given of wheat bunt (*Tilletia tritici* and *T. levis*) [*T. caries* and *T. foetens*] in Germany with special reference to the effect of the disease on the milling quality of the grain [cf. *R.A.M.*, x, p. 716]. Great difficulties are presented by the various methods that have been devised for the detection in the grist of the spores of these fungi, some $3\frac{3}{4}$ millions of which are estimated to be contained in each bunt ball. So excessively light are these organs that 450,000 weigh only 0·001 gm.: in threshing operations they are readily scattered from the broken balls and disseminated among the grains, usually alighting in the beard hairs, producing the so-called 'blue tip' effect, or in the furrow.

In the course of the examination at the Berlin Milling Institute of 120 wheat samples of the 1935 harvest, 30 had to be rejected on account of bunt; of these 7, though emitting the familiar odour of trimethylamine [ibid., xiv, p. 432], failed to show on analysis the presence of bunt balls, which were detected, however, to the extent of up to 0·02, between 0·03 and 0·05, between 0·06 and 0·10, between 0·11 and 0·20, and above 0·2 per cent. in 9, 8, 2, 2, and 2 samples, respectively. Members of the Institute staff are of the opinion that the presence of three bunt balls (0·04 per cent.) per 100 gm. of seed-grain should not constitute a reason for a rebate in price, the same applying to 3 per cent. blue-tipped grains or to 2 per cent. blue tip and one bunt ball per 100 gm. A rebate should be made, however, where the samples reveal

4 to 10 bunt balls or 4 to 10 per cent. blue tip, and a proportionately larger one where the incidence of infection exceeds these figures.

MARCHIONATTO (J. B.). **Enfermedades del Trigo poco conocidas y radicadas en la región oeste de la zona triguera.** [Little known Wheat diseases indigenous to the western section of the Wheat-growing area.]—*Bol. Minist. Agric., B. Aires*, xxxvi, 4, pp. 293-299, 4 col. pl., 1934. [Received February, 1936.]

Among the fungi isolated from specimens of wheat affected by diseases of the foot-rot group in the Argentine since 1929 were *Gibberella saubinetii* from the roots, shoots, ears, and grain; *Helminthosporium sativum* from the roots, basal internodes, shoots, and once from the grains of Kubanka imported from the United States; *Ophiobolus graminis* from the foot region [*R.A.M.*, xii, p. 683]; and *Alternaria peglionii* [ibid., x, p. 21; xiii, p. 21] and *Fusarium moniliforme* var. *subglutinans* [*Gibberella fujikuroi* var. *subglutinans*: ibid., xiv, p. 427] from the grain. A map shows the distribution of the three first named in the provinces of Cordoba, Buenos Aires, La Pampa, and other wheat-growing centres. Notes are also given on the symptoms, modes of infection and perpetuation, and control of these fungi.

BUCHWALD (N. F.). **Undersøgelser over Bygrust (Puccinia hordei Otth).** [Investigations on Barley rust (*Puccinia hordei* Otth).]—Reprinted from *Beretn. Nord. JordbrForskn. Kongr. 1935*, 9 pp., 1935.

In 1865 Körnicke differentiated a variety *simplex* on barley of the collective species *Puccinia straminis* Fckl (previously named by De Candolle *P. rubigo-vera*) [*R.A.M.*, xiv, p. 746], but in 1894 Eriksson and Henning raised this varietal name to specific rank as *P. simplex*. In the meantime, however, the barley rust had been described at least three times as an independent species, viz., in 1871 by Otth as *P. hordei*, in 1875 by P. Nielsen as *Uromyces hordei*, and in 1878 by O. Rostrup, in a technical description of v. Thümen's exsiccata, as *P. anomala*. The last name has been generally accepted in the Danish literature as the correct designation of the barley rust, whereas *P. simplex* has been widely used abroad until recent years; at the present time a tendency to revert to the use of *P. anomala* is apparent. The name *P. simplex* is invalid both because it had been used by Peck in 1881 to describe an entirely different rust on *Geum*, and because it was employed by Körnicke only as a varietal and not as a specific name. The preference of Arthur for Rostrup's name appears to be based on a chronological error, the statement that Fuckel's designation, *P. hordei* on *Hordeum murinum*, was published in 1860 being refuted by a careful perusal of the relevant literature, which shows 1873 (Symb. myc., II Nachtrag) to have been the date of issue. According to the rules of nomenclature now in force, *P. hordei* Otth (1871) is the oldest and hence the correct name for the barley rust, while *P. hordei* Fckl (1873) appears to be a distinct species, and the writer proposes for it the name of *P. fuckelii*.

The teleutospores of *P. glumarum* are found more frequently on the sheaths than on the blades, and in very severe cases may occur on

the upper portions of the straw, the awns, and the grain. On the blades the stripes formed by the teleutosori are generally short and tend to amalgamate, whereas on the sheaths they may extend for a considerable length and appear never to converge; the latter are composed of irregular, spherical to oval, markedly convex spots, 0·1 to 0·5 mm. in diameter, those on the blades being narrower, more striate, often almost spindle-shaped. On the sheaths the teleutospores are dark to blackish-brown and very shiny, on the blades almost coal-black and duller.

The teleutospores of *P. hordei*, in contrast to those of *P. glumarum*, develop mostly on the leaf blades. Infection has occasionally been observed by the writer on the awns but never on the straw. The teleutospores are never arranged in definite striations but are scattered over the surface; on the blades they are punctiform, shortly linear or almost quadratic, often only 0·1 mm. in diameter, while on the sheaths they produce larger, oblong spots. The teleutospores of *P. hordei* are only slightly convex, greyish- to coal-black, and dull.

The examination of some 100 collections of *P. glumarum* and *P. hordei* (including Otth's original material of the latter) showed that the two species are distinguishable by the number of unicellular teleutospores (mesospores), which constituted 80·53 per cent. of the total in *P. hordei* as against only 9·97 per cent. in *P. glumarum*. In both species the length of the teleutospores is practically the same (about 50 μ), but in *P. glumarum* the terminal cell is always rather longer than its width, whereas in *P. hordei* these dimensions are approximately equal. The terminal and basal cells in *P. glumarum* are about the same length. On an average the teleutospores of *P. hordei* are wider by 4 to 5 μ than those of *P. glumarum*.

TAPKE (V. F.). **An effective and easily applied method of inoculating seed Barley with covered smut.**—*Phytopathology*, xxv, 11, pp. 1038–1039, 1935.

The study of physiologic specialization in *Ustilago hordei*, the agent of covered smut of barley [*R.A.M.*, vii, p. 560], has been greatly facilitated by the following comparatively simple and very effective method of seed-grain inoculation. Six-gram lots of seed are placed in $\frac{7}{8} \times 3$ in. shell vials, into which is poured a spore suspension (1 gm. spores thoroughly shaken in 1 l. water) until the fluid rises $\frac{3}{4}$ in. above the seed; this is vigorously shaken in the liquid for $\frac{1}{2}$ minute and left to soak for 15 minutes. The suspension is then decanted and the vials inverted on clean blotting-paper to absorb all free water prior to packing in a tightly covered tin box floored with a moistened blotter for 24 hours' incubation at 20° C., after which the seed is transferred to envelopes, left wide open, for two or three days' drying before sowing. In field plantings of spring and winter barleys in 1934 and 1935 up to 70 per cent. of smutted heads were obtained by this method.

TAPKE (V. F.). **A study of the cause of variability in response of Barley loose smut to control through seed treatment with surface disinfectants.**—*J. agric. Res.*, li, 6, pp. 491–508, 1 pl., 1 fig., 1935.

The author gives a tabulated account of further investigations, the results of which confirmed the wide distribution in the United States

and the considerable economic importance of *Ustilago nigra* [*R.A.M.*, xiii, p. 691; cf. also xiv, p. 353] on barley. This fungus resembles *U. nuda* in the emergence and appearance of smutted barley ears, the dissemination of spores during the heading and flowering period of the host, and in the fact that it can infect the latter through the flowers; it differs, however, in the mass colour (dark chocolate-brown) of its spores, and in that it may be controlled by treating the seed produced by infected flowers with certain surface disinfectants [loc. cit.]. The reported control of loose smut of barley by this method [ibid., ix, p. 517; xi, p. 567] is explicable on this basis. Furthermore, on 2 per cent. potato dextrose agar at 70° F. the spores of *U. nigra* germinate by producing a promycelium bearing typically four lateral sporidia, while under the same conditions no sporidia are formed by *U. nuda*, and *U. nigra* may also produce smutted plants by infection of the seedlings raised from seed inoculated when mature. The work also showed that some of the most important barley varieties in the United States are highly susceptible to *U. nigra*. To facilitate distinction, the terms 'brown' and 'black' loose smut of barley are suggested for *U. nuda* and *U. nigra*, respectively.

Der Kronenrost des Hafers (Puccinia coronifera). [Crown rust of Oats (*Puccinia coronifera*).]—*Dtsch. landw. Pr.*, lxii, 47, p. 572, 1935.

Crown rust of oats (*Puccinia coronifera*) [*P. lolii*], stated to be ordinarily of little or no importance in Schleswig-Holstein [*R.A.M.*, xiii, p. 428], developed in an extremely severe form in various parts of that province at the end of July, 1935. The reddish-brown uredospores of the rust were produced in such numbers that at harvesting dense clouds of spore dust enveloped the workers, horses, and machinery, and settled as a thick reddish crust on the ground. According to a member of the Kiel Plant Protection Headquarters, the alternate host of the rust, *Rhamnus cathartica*, bore a profusion of aecidia, which were presumably responsible for this very unusual outbreak of the disease. The yields were not appreciably reduced and no special control measures are considered to be necessary, since the meteorological conditions predisposing to infection are unlikely to recur frequently. Diseased material should not be used for fodder.

IVANOFF (S. S.). **Studies on the host range of Phytomonas stewarti and P. vascularum.**—*Phytopathology*, xxv, 11, pp. 992-1002, 3 figs., 1935.

The host range of *Phytomonas* [*Aplanobacter*] *stewarti* [*R.A.M.*, xv, p. 12] and *P.* [*Bacterium*] *vascularum* [ibid., xiv, p. 531] was investigated in a series of greenhouse and field inoculations on sorghum, sugar-cane, Sudan grass (*Holcus sudanensis*) [*Sorghum sudanense*], *Setaria glauca*, *S. italica* var. *stramineofructa*, and *Panicum miliaceum*.

Some common resemblances were observed between the symptoms induced on all the hosts by both pathogens, together with certain differential features varying with the plants. The similarities included the formation of stripes along the veins in the manner characteristic of *A. stewarti* [ibid., xiii, p. 298], the development of semicircular or irregular areas on either side of the vein, the colour and consistency

depending on the host, and a general discoloration of the green parenchymatous tissue adjoining the affected portions. The differences are connected chiefly with the colour of the veins and of the contiguous areas and with the consistency and distribution of the latter, besides variations in the length of the incubation period, which in the case of maize inoculated in the greenhouse, for instance, was twice as long for *Bact. vascularum* as for *A. stewarti*. In the case of maize, *S. glauca*, *S. italica* var. *stramineofructa*, and *P. miliaceum* inoculated with *A. stewarti* the affected veins and adjacent areas were tan to light brown, while in those of sorghum and Sudan grass they were red. The colour of the same infected tissues in plants inoculated with *Bact. vascularum* was light brown to rusty in maize and red in sorghum. All the light brown areas (in contrast to the red) in each host, irrespective of the pathogen, were water-soaked at first, later becoming necrotic and dry. Rotting of the maize and sorghum stalk tissues was induced by both pathogens, *A. stewarti* causing a pale discoloration and *Bact. vascularum* a deeper tinge on sorghum while no striking differences were observed on maize.

The 25 sugar-cane (Co. 281 and C.P. 807) seedlings inoculated with *A. stewarti* failed to contract infection, but this negative result is not considered to be necessarily conclusive. The Kansas Orange sorgo variety of sorghum showed a high degree of resistance to *A. stewarti* in the field. *Bact. vascularum* was responsible for cavities in the stalks of Roxorange sorghum as well as in those of Golden Gem (sweet) and Leaming (field) maize.

Winston (J. R.). **Reducing decay in Citrus fruits with borax.**—*Tech. Bull. U.S. Dep. Agric.* 488, 32 pp., 7 figs., 14 graphs, 1935.

The common stem-end rots (*Diplodia natalensis* and *Diaporthe citri*) and the green and blue moulds (*Penicillium digitatum* and *P. italicum*) of citrus (orange, tangerine, lemon, and grapefruit) have been found to yield in Florida to a bath containing not less than 8 per cent. borax, in which the fruits should be immersed immediately on arrival at the packing-house [*R.A.M.*, xiii, p. 763]. The treatment was equally effective on fruit requiring colouring and on that already fully coloured on harvesting, but firm fruits responded much more readily than those that were over-ripe and about to drop from the trees. The wet fruits should be dried slowly and the borax residue left on them for several hours. In cold weather the temperature of the rind should be raised to about 90° F. before applying the treatment either by warming the fruit in the colouring rooms or by slow passage through long tanks with heated borax solution. In well-organized packing-houses the cost of this treatment has not exceeded ½ to ⅔ cent per 100 lb. fruit, and its value is reflected by a reduction of the incidence of decay in transit and in improved keeping quality on arrival at the market and in the hands of the retailer and consumer.

Reinboth (G.). **Genossenschaftskrankheitsbekämpfung und die Zitronenproduktion.** [Co-operative disease control and Lemon production.]—*Z. PflKrankh.*, xlv, 11, pp. 550–554, 1935.

During the period from 1931 to 1933 the abundant lemon harvests

in Sicily, together with the collapse of the calcium citrate industry, resulted in a slump which deprived the local growers of all possibility of contributing to the co-operative disease control organizations. Excellent work has been done by these bodies since the middle years of the last decade, when they were initiated primarily to combat a formidable scale insect and 'mal secco' [*Deuterophoma tracheiphila*: *R.A.M.*, xii, pp. 256, 565 and next abstract], but even with the aid of a Government subsidy of 3,000,000 lire, allotted in 1933, the experts have so far been unable to stem the ravages of the disease, which reduced the 1934–5 harvest to a quarter of the normal. The offer by the phytopathological administration of a reward for the discovery of a means of control has not yet yielded any tangible result.

A brief note (pp. 554–555) on the symptoms and etiology of 'mal secco', based on Petri's researches, by Prof. v. Tubeuf is appended.

Casella (D.). **Le malattie degli Agrumi e lo stato attuale dei rimedi relativi.** [Citrus diseases and the present state of the appropriate treatments.]—*Ann. Staz. Agrum. Frutt. Acireale*, N.S., ii, pp. 239–253, 1935.

Notes are given on the symptoms and control of the chief fungal diseases affecting citrus in Sicily.

Rhizoctonia root rot [*Corticium solani*: *R.A.M.*, xii, p. 214] of nursery seedlings is favoured by excessive soil humidity. Root rot due to unfavourable soil conditions is associated with: *Armillaria mellea*, *Sclerotinia libertiana* [*S. sclerotiorum*], *Rosellinia pepo*, *Fusarium* spp., *Phytophthora citrophthora*, and *P. parasitica* [ibid., ix, p. 302]. Gummosis, caused by *P. citrophthora* or *P. terrestris* [*P. parasitica*: ibid., xv, p. 90], attacks the following hosts (arranged in decreasing order of resistance): bitter orange [*Citrus aurantium* var. *bigaradia*], *Poncirus* [*trifoliata*], grapefruit, rough or Florida lemon, mandarin, sweet orange, lemon, and lime. *P. citrophthora* is particularly injurious to lemon, and *P. parasitica* to sweet orange; the former fungus is favoured by a temperature of 20°, the latter by one of 30° C.

Mal secco (*Deuterophoma tracheiphila*) [see preceding abstract] infection is stated to be reducible by the prompt removal and destruction of the affected parts and the disinfection of the wounds left at the end of August and the beginning of February, and a special commission has been appointed in Sicily to supervise this work. In preliminary tests very promising results were given by applications to affected lemon trees of 100 gm. manganese dioxide and 2 kg. slaked lime per tree, this treatment arresting the spread of the disease or greatly retarding death; it did not, however, prevent new infections. The best times for making the applications (which should be repeated every two years) were in January and February and August and September. Attempts to find resistant varieties of lemon [ibid., xiv, p. 680] showed that the Meyer lemon may prove very satisfactory for hybridization purposes.

Thorold (C. A.). **Progress report on Elgon dieback of Coffee.**—*E. Afr. agric. J.*, i, 3, pp. 225–228, 1935.

Coffee growing on Mount Elgon, Kenya, is widely affected by a con-

dition referred to as 'Elgon die-back' [*R.A.M.*, xiv, p. 426]. This affects almost any leafy part, from a small secondary or tertiary branch to a whole sucker or a large part of the top. Usually all or part of a primary branch wilts, later turning brown and black. Die-back sets in and slowly spreads, generally becoming arrested at the junction of the branch with the main stem. In some seasons the earliest visible stages are accompanied by blackening. One or more nodes or internodes may be discoloured, and the base of the leaf turns black. The symptoms vary greatly according to the individual tree and the season of the year.

The condition is associated with species of *Phoma* (frequent), *Phomopsis*, *Diplodia* (infrequent), *Colletotrichum* (rare), (?) *Sphaeropsis*, and other fungi, while bacteria were sometimes present. Inoculations with pure cultures of the more commonly occurring organisms gave negative results and the die-back is thought probably to be of physiological origin.

Prevalence is greatest on exposed slopes and least on trees provided with sufficient shade. The disease is generally absent from or rare in localities where coffee berry disease [*Colletotrichum coffeanum*: ibid., xiii, p. 367; xiv, p. 32] is present, the optimum conditions for the development of the two diseases being directly opposed. Vigorous trees in relatively good health are affected, the worst features, however, occurring on already debilitated trees, on which the loss of suckers and primary branches may seriously reduce the yield, which otherwise is unaffected. Some trees, particularly a copper-tip type present to the extent of about 10 per cent. in French Mission coffee, appear to be highly resistant.

The only methods of control that can be recommended at present are the use of resistant trees (with loss of quality in the coffee) or shade. Further investigations are in progress.

[This paper also appears in *Mon. Bull. Coffee Bd Kenya*, i, 10, pp. 10–11, 1935.]

Rolfs (F. M.). **Dissemination of the bacterial leaf spot organism.**—Abs. in *Phytopathology*, xxv, 10, p. 971, 1935.

Seed has been found to be the source of both primary and secondary infection of the cotton crop by *Bacterium malvacearum*. Internal seed infection [*R.A.M.*, ix, p. 377; x, p. 661; xii, p. 141] may occur either directly while the boll is quite young, or indirectly by the entry of contaminated water through a break in the outer seed coat of mature seed at the micropyle.

Water is an important agent of dissemination. The bacteria were carried 980 ft. in rill water. The green leaf bacteria are capable of independent movement over a radius of 12 in. or more in still water. The age limit of free bacteria in distilled water is about 60 hours. The life of the organisms is shortened by soluble soil salts in contaminated pool water. The more exposed parenchyma infections tend to be eliminated by hot, dry weather, the leaf spots becoming less angular and vascular invasion developing more prominently. The accumulation of the bacteria in the veins and midrib hastens leaf-shedding and affords better protection for the parasite from adverse weather conditions.

Wind also plays an active part in dissemination. A single whirlwind scattered the infected dry leaf material over an area of 100 acres in 20 minutes.

Azevedo (N.). **Nota sobre o 'Diplodia' do Algodoeiro.** [A note on Cotton '*Diplodia*'.]—*Rodriguésia*, i, 2, pp. 97–98, 1 fig., 1935.

In 1933 cotton growing in experimental plots in Rio Janeiro was found to show varying degrees of boll infection by a *Diplodia* with the characters of *D. gossypina* [*R.A.M.*, x, pp. 96, 240; xii, p. 366], not previously recorded on cotton bolls in Brazil.

Schwartz (W.). **Untersuchungen über die Symbiose von Tieren mit Pilzen und Bakterien.** [Studies on the symbiosis of animals with fungi and bacteria.]—*Arch. Mikrobiol.*, vi, 4, pp. 369–460, 1935.

A comprehensive summary, supplemented by a five-page bibliography, is given of the investigations hitherto accomplished on the problem of symbiosis between insects and fungi or bacteria [*R.A.M.*, xiv, p. 306 and next abstract].

Extreme difficulty is experienced in obtaining pure cultures of the endosymbiotic micro-organisms owing to the high degree of adaptability of the majority of the fungi and bacteria concerned to their hosts. In cases where successful results have been obtained the symbionts were found to represent widespread groups of fungi and bacteria of a primarily saprophytic habit of life. There would seem to be no basis for the belief in 'mutualism', connoting a capacity in the host for the selection of such symbionts as will promote its vital functions. On the contrary, endosymbiosis between insects and vegetable forms of life may be regarded as a stage in which the symbiont assumes the role of a harmless parasite. In some cases there may be an inversion of the parasitic relationship whereby the symbiont becomes indispensable to the host.

Ries (E.). **Über den Sinn der erblichen Insektensymbiose.** [On the significance of hereditary insect symbiosis.]—*Naturwissenschaften*, xxiii, 44, pp. 744–749, 2 figs., 1935.

On the basis of his own investigations and those of others the writer summarizes the present position in regard to the knowledge of hereditary symbiosis between insects and fungi or bacteria [see preceding abstract]. To the category of hereditary symbiosis are considered to belong all partnerships characterized by specialized organs, regular occurrence, and transmission to the progeny. From an experimental analysis of the uses of the connexion arises a further division into mutual and helotistic symbiosis, the former implying the existence of advantages on both sides while the latter denotes that the symbiont is completely in the power of the host, which simply allows it to degenerate when no longer of use; yet another aspect of the relationship is that of parasitism or commensalism, in which the symbiont parasitizes the host without conferring any benefit in return, or remains within the insect after its nutritional functions are exhausted.

Benatar (R.). **Fungos entomogenos dos Citrus.** [Entomogenous fungi of Citrus.]—*Rodriguésia*, i, 2, pp. 7–10, 1 fig., 1935.

Brief, popular notes are given on the following entomogenous fungi found on citrus in Brazil, viz., *Aschersonia aleyrodis* [*R.A.M.*, xii, p. 568; xiii, p. 698], which is very commonly parasitic on Aleyrodidae on orange leaves, *A. goldiana* [ibid., vi, p. 419], which chiefly attacks *Dialeurodes citrifolii*, *A. turbinata* [loc. cit.], which attacks coccids, *Sphaerostilbe aurantiicola* [loc. cit.], *S. flammea*, *S. coccidophthora* [ibid., x, p. 708; xii, p. 144], *Podonectria coccicola* [ibid., xiv, p. 98], *Myriangium duriaei* [loc. cit.] and a *Septobasidium*, at present considered to be *S. albidum* [ibid., xiii, p. 90], which is abundantly present in most citrus plantations in Brazil and may cause considerable damage by infecting large areas of the surface of the fruit near the peduncle.

Report of Proceedings of the inter-State Locust Conference, Pretoria, 30th July to 3rd August, 1934.—Issued by *Dep. Agric. For. S. Afr.*, 116 pp., 5 pl., 4 figs., 14 maps, 1935.

In this report the following references of mycological interest are made. In May [? 1934] great numbers of red locusts (*Locusta migratoria migratorioides*) were killed off by disease in the Massa and Mozambique districts of Portuguese East Africa, and *Empusa grylli* [*R.A.M.*, xiv, p. 427] was identified in the bodies of the dead insects. At about the same date an epidemic causing a high mortality among red locusts was reported from Quelimane's District; of four insects which reached the insectary alive after dispatch from the area concerned one died after two, two after five, and the fourth after eleven days. The dead insects showed the presence of a fungus agreeing with the description of *Sporotrichum paranense* [ibid., xiv, p. 98]. Two locusts inoculated with spores of the fungus developed a marked red coloration and died in seven days. A few hours after death the head, femur, hind legs, and pronotum turned white and the internal organs green, all these parts showing the presence of the fungus.

In the Union of South Africa *E. grylli* was certainly present in various parts of the north, and in Natal and Zululand, while it was reported from the vicinity of Pretoria. Almost invariably, however, its effects in controlling the locusts were disappointing, well under 10 per cent. of the insects being attacked, as a rule, in any locality. In Southern Rhodesia, on the other hand, large numbers of locusts were killed by the fungus. In Northern Rhodesia it is stated to have cleared the area where it first appeared in February from locusts; it spread to an astonishing extent in March, and in the west wiped out the young bands of insects; it destroyed many young flying swarms, and in April and May accounted for most of the remaining locusts in most localities. In Tanganyika *E. grylli* is so active among the locusts that local workers doubt the wisdom of killing swarms where the disease is present; the fungus also attacks grasshoppers in that country.

E. grylli is regarded as the most important enemy of the red locust in the regions referred to above and the conference considered it desirable that further research on all aspects of the disease should be undertaken.

PATAY (R.). **Sur un champignon parasite du Doryphore (Leptinotarsa decemlineata Say).** [On a parasitic fungus of the Colorado Beetle (*Leptinotarsa decemlineata* Say).]—*Bull. Soc. sci. Bretagne*, xii, 1–2, pp. 62–66, 3 figs., 1935.

Beauveria doryphorae [*R.A.M.*, xiv, p. 507], found parasitizing adults of the Colorado beetle (*Leptinotarsa decemlineata*) bred in the laboratory at the Faculty of Sciences, Rennes, in 1934, is stated to differ in the absence of pigmentation in culture from the related entomophytes, *Spicaria* (*Isaria*) *farinosa* [ibid., xiii, p. 574], *B. globulifera* [ibid., xiii, p. 302], *B. densa* [ibid., xi, p. 179], *B. bassiana* [ibid., xv, p. 150], and *B. effusa* [ibid., v, p. 96], the colonies of which are chamois- to lemon-yellow, yellowish-green, red, bright red (on potato), and flocculent and red (potato), respectively.

Both in the imago and larval stages the insects contracted the disease while in full activity and rapidly succumbed; those experimentally sprayed with conidia failed to reach maturity. The onset of infection was nearly always marked by the development of a black spot on the cuticle. The exact mode of infection was not determined, but it was shown to be systemic and to meet with very little resistance. Contamination of the nymphs proved to be difficult and that of the eggs impracticable. It is evident that this disease is quite distinct from that described by Dieuzeide as attacking hibernating imagos of *L. decemlineata* but sparing the adults. Large-scale experiments are necessary to determine the value of *B. doryphorae* as an agent in the control of the pest.

HENDEE (ESTHER C.). **The rôle of fungi in the diet of the common damp-wood termite, Zootermopsis angusticollis.**—*Hilgardia*, ix, 10, pp. 499–525, 8 graphs, 1935.

In this expanded account of the author's experiments in feeding termites (*Zootermopsis angusticollis*) on fungus-containing and fungus-free diets, a condensed version of which has already been noticed from another source [*R.A.M.*, xiv, p. 166], it is stated that the inadequacy of fungus-free filter paper as a diet was demonstrated by the failure of individually isolated termites to make significant gain in dry weight and by the high mortality, great loss in group weight, and low gain in average weight in groups of termites on a diet of filter paper, as compared with those on their natural diet of rotten wood. The data obtained indicate that the fungi probably supply vitamins essential to the normal growth and development of the insects.

MAURIZIO (ANNA). **Beiträge zur Kenntnis der Pilzflora im Bienenstock. I. Die Pericystis-Infektion der Bienenlarven.** [Contributions to the knowledge of the fungus flora of the beehive. I. *Pericystis* infection of Bee larvae.]—*Ber. schweiz. bot. Ges.*, xliv, pp. 133–156, 2 pl., 7 figs., 5 graphs, 1935.

Further researches on the so-called 'chalk brood' disease of bees, whereby the larvae are converted into white, calcified mummies, and its causal organism (*Pericystis apis*) [*R.A.M.*, ix, p. 524] are fully described. The disturbance appears to be spreading throughout

Switzerland. The heterothallic fungus was found to occur in the honeycombs in two different forms, experiments in the crossing of which have so far given negative results. One is the form (herein referred to as 'small-fruited') originally described by Claussen (*Arb. biol. Reichsanst. Land- u. Forstw.*, x, [p. 467], 1921), while the other ('large-fruited') seems to be a new development. Both were carefully studied in cultures on beerwort agar and the development of the fruit bodies from antheridia and oogonia investigated in detail. In both forms the oogonia become dark brown and the contents divide into a number of spore balls but whereas the large type of fruit body is spherical, piriform, or oval when ripe, the small type is regularly spherical. The average dimensions of the large fruit bodies were found to be $128{\cdot}44 \pm 0{\cdot}80\,\mu$ compared with $65{\cdot}84 \pm 0{\cdot}51\,\mu$ for the small type. The optimum temperature for the growth of both forms is about 30° C., but the large-fruited makes better progress than the small at lower temperatures. In the small-fruited form the male mycelium grows more rapidly than the female, a difference that was not observed in the large type. Fruit body formation reached a maximum in the large-fruited form at 20° and in the small one at 30°. A tendency to sterility is much more pronounced in the large-fruited form than in the small one, especially at high temperatures. Both types of *P. apis* induced strong fermentation of levulose, dextrose, galactose, and maltose, while the small one also utilized saccharose and lactose; starch was more extensively decomposed by the small than by the large form. In spite of the differences manifest between the two forms, no specific distinction between them is made pending further studies on the biology of the new type and its part in the etiology of 'chalk brood'.

Cortella (E.). **Sopra un particolare caso di erosioni degli spazi interdigitali dei piedi da simbiosi schizosaccaromycetica.** [On a peculiar case of erosions of the interdigital spaces of the feet due to Schizosaccharomycetous symbiosis.]—*Boll. Sez. reg.* (*Suppl. G. ital. Derm. Sif.*), xiv, 4, pp. 352–358, 1935.

The writer describes and discusses a localized eruption of the interdigital spaces on the feet of a 28-year-old naval officer; in which a *Staphylococcus*, a *Cryptococcus* (determined by Prof. Nannizzi) with oval conidia 3 to 5 by 2·5 or 3·5 to 4 by $2{\cdot}5\,\mu$, and chlamydospores, 4 to 4·5 by $3\,\mu$, and *Trichophyton acuminatum* [*R.A.M.*, xiii, pp. 237, 768, and next abstract] were implicated. In the case of the first two true symbiosis was definitely indicated, whereas the last is believed to have been an accidental contaminant.

Crawford-Jones (C.). **Dermatomycosis in the army.**—*J. R. Army med. Cps*, lxv, 5, pp. 306–316, 1935.

A summary is given of the author's clinical, etiological, diagnostic, and prophylactic observations on various common forms of dermatomycosis, associated primarily with *Microsporon audouini*, *M. lanosum*, *Trichophyton crateriforme*, *T. acuminatum* [see preceding abstract], *T. violaceum*, *T. cerebriforme*, *T. plicatile*, *T. asteroides* (*gypseum* group), *T. mentagrophytes* [*R.A.M.*, xv, p. 92], *T. radians* (*niveum* group) [ibid.,

xiv, p. 101], *T. rosaceum*, and *T. ochraceum*, which are stated to be greatly increasing in prevalence in the British army.

Hruszek (H.). **Über die Pilzflora der Tübinger Gegend.** [On the fungous flora of the Tübingen district.]—*Derm. Wschr.*, ci, 48, pp. 1506–1512, 1935.

A tabulated account is given of the writer's studies on dermatomycoses in the Tübingen district of Germany from June, 1934 to July, 1935, from which it appears that out of 49 cases of ringworm (excluding those affecting the hands and feet) *Trichophyton gypseum asteroides* [*T. mentagrophytes*: see preceding and next abstracts] was responsible for 28, yeasts for 10, and miscellaneous species of *T.*, *Achorion*, *Acremonium*, and *Epidermophyton* for the remainder. Of the 69 cases of ringworm of the hands and feet, 33 were caused by *E.* Kaufmann-Wolf [ibid., xv, p. 151], 24 by yeasts, and the rest by various species of the above-mentioned genera and *Cephalosporium*. A summary is given of the clinical observations in a few cases of special interest.

Carrión (A. L.). **Observations on dermatomycosis in Puerto Rico.**—*Puerto Rico J. publ. Hlth*, x, 3, pp. 255–261, 7 pl., 1935. [Spanish translation, pp. 263–269.]

Trichophyton rubrum [*R.A.M.*, xiv, pp. 632, 695] would appear, from the writer's laboratory studies on 150 cases of tinea cruris in Porto Rico, to be the only fungus related to the disorder in question on the Island. Tinea of the feet, however, seems to be associated with at least three different species, viz., *T. rubrum*, *T. mentagrophytes* [see preceding abstracts], and *Epidermophyton floccosum* [ibid., xiv, p. 759]. Two strains of the last-named, differing in certain cultural characters on Sabouraud's medium, were isolated from the affected parts in two cases, both in young men, of tinea of the feet. In one case the hand, the finger-nails, and the toe-nails, were involved, this being apparently the first record of *E. floccosum* causing nail infection. Another interesting feature of this case was the simultaneous presence in the nails of *T. rubrum*.

Carrión (A. L.). **Chromoblastomycosis. Preliminary report on a new clinical type of the disease caused by Hormodendrum compactum, nov. sp.**—*Puerto Rico J. publ. Hlth*, x, 4, pp. 543–545, 1 pl., 1935. [Spanish translation, pp. 546–548.]

Six cases of chromoblastomycosis have been investigated in Porto Rico since 1931, the source of infection in four being *Hormodendrum* [*Trichosporium*] *pedrosoi* [*R.A.M.*, xiv, p. 509], in one undetermined, and in the remaining patient, a 50-year-old agricultural labourer, due to a new species, *H. compactum* [see next abstract]. The fungus forms scanty, dark olive colonies on Czapek's solution agar and grows slowly on Sabouraud's maltose agar. The hyphae measure 2·5 to 5·2 μ in diameter and occasionally tend to branch dichotomously at the tips; the olivaceous, erect or ascending conidiophores, poorly differentiated from the vegetative hyphae, bear at their apices compact groups of smooth, olivaceous, subspherical, concatenate conidia, 2·5 to 4·8 by

2·5 to 3·8 μ, the basal element in the spore chain measuring 3·8 to 6 by 3 to 4·5 μ, each conidium being capable of bearing secondary spores at the tip, laterally, or basipetally.

Carrión (A. L.) & Emmons (C. W.). **A spore form common to three etiologic agents of chromoblastomycosis.**—*Puerto Rico J. publ. Hlth*, xi, 1, pp. 114–115, 1935. [Spanish translation, pp. 116–117.]

Three fungi, indistinguishable *in vivo* but very different in culture, are known as agents of chromoblastomycosis. In *Phialophora verrucosa* [*R.A.M.*, xiv, p. 509], small, oval spores are successively budded out in the cup-like mouth of a flask-shaped conidiophore. In *Hormodendrum* [*Trichosporium*] *pedrosoi* [see preceding abstract] larger, oval conidia are borne in branching chains on simple or branched conidiophores, and in acropleurogenous arrangement at the tips of simple conidiophores. In *H. compactum* [loc. cit.] subspherical conidia are borne in branching chains on simple or branched conidiophores.

In one strain of *T. pedrosoi* the writers recently found, in addition to abundant *Hormodendrum* conidia, a few conidiophores and conidia of the *Phialophora* type. The subsequent examination of four Porto Rican and two South American strains of *T. pedrosoi*, and of the one described strain of *H. compactum*, revealed occasional sporulation of this type in all, thereby affording unmistakable evidence of a close relationship between three well-differentiated species now distributed in two remote genera.

Franchi (F.). **Lesioni cutanee da Cephalosporium acremonium Corda.** [Cutaneous lesions caused by *Cephalosporium acremonium* Corda.] —*Boll. Sez. reg.* (*Suppl. G. ital. Derm. Sif.*), xiv, 4, p. 405, 1935.

A fungus identified by Prof. Pollacci as *Cephalosporium acremonium* [*R.A.M.*, xiv. p. 695] was isolated from abscesses on the body and extremities of a 42-year-old peasant woman. The fungus (a plant parasite) [ibid., xiv, p. 405] is believed to have spread upwards from the left foot, where the first symptoms of the trouble were experienced. Positive results were given by the subcutaneous inoculation of a mouse with a spore suspension of the fungus, which was recovered in pure culture from the lesions thus induced.

Ferrari (A. V.). **Sopra un caso di haplografiosi.** [On a case of haplographiosis.]—*Boll. Sez. reg.* (*Suppl. G. ital. Derm. Sif.*), xiv, 4, pp. 395–397, 1 pl., 1935.

The fungus isolated from the dry, erythemato-squamous lesions on the palm of the hand of a female patient was characterized on Sabouraud's medium by greyish-white colonies, successively turning greenish, dark grey, and inky-black, by branched, septate, hyaline, later dark hyphae, and simple, erect, septate conidiophores, bearing at the apices sterigmata with lemon-shaped, concatenate conidia. It was identified by Prof. Pollacci as *Haplographium de bellae marengoi* [*R.A.M.*, xiii, p. 30]. The case is considered to be of some interest, not only by virtue of the rarity of the fungus, but also on account of the superficial nature of the lesions induced, resembling those of the epidermomycoses.

Kobayasi (T.). **Beiträge zur experimentellen Sporotrichose. I. Mitteilung : Impfversuche mit Sp. beurmanni (Stamm von Kobayasi) an weissen Ratten und Kaninchen.** [Contributions to the knowledge of experimental sporotrichosis. Note I: inoculation experiments with *Sporotrichum beurmanni* (Kobayasi's strain) on white rats and rabbits.]—*Jap. J. Derm. Urol.*, xxxviii, 5, pp. 747-770, 7 figs., 1935. [Japanese, with German summary on pp. 107–109.]

Clinical details are given of the writer's inoculation experiments on white rats and rabbits with a strain of *Sporotrichum beurmanni* previously isolated from one of his patients [*R.A.M.*, xiv, p. 309]. In the lesions thus induced the fungus appeared in the form of globular or oval elements, 2 to 3 μ in diameter, with a strongly refractive capsule. The fungus was recovered in every case from the experimental material.

Stiles (G. W.) & Davis (C. L.). **A case of bovine coccidioidal granuloma from the southwest.**—*J. Amer. vet. med. Ass.*, lxxxvii, 5, pp. 582–585, 3 figs., 1935.

Spherical, double-contoured bodies, 10 to 40 μ in diameter, were isolated from an abscess of the posterior mediastinal lymph-gland in a Hereford steer at Denver, Colorado, in 1935, and transferred after 48 hours' incubation at 37° C. to meat infusion agar, on which a white, cottony growth composed of long, septate, branching hyphae developed. The fungus was identified as *Coccidioides immitis* [*R.A.M.*, xiv, p. 759], of which there is believed to be only one previous record in the State [ibid., xii, p. 692].

Negroni (P.). **La cápsula de la Mycotorula albicans (Ch. Robin, 1853).** [The capsule of *Mycotorula albicans* (Ch. Robin, 1853).]—*Rev. Inst. bact., B. Aires*, vi, 5, pp. 671–676, 1 fig., 1935. [French and English summaries.]

The writer describes the capsule of the thrush fungus (*Mycotorula* [*Candida*] *albicans*) [*R.A.M.*, xv, p. 152 and next abstract], of which this is stated to be the first record. It is most conspicuous in 15-hour-old cultures on glucose, maltose, and levulose, incubated at 37° C. and stained by Huntoon's method (*J. Bact.*, ii, p. 241, 1917). The capsule resists repeated washings with borate and sodium bicarbonate solutions, boiling in water, and two hours' shaking with glass beads, and also withstands the action of 0·5 per cent. formol and alcohol-acetate. It is almost entirely disintegrated, however, by 1 to 2 per cent. sodium hydroxide, especially after boiling. The capsule is formed in culture media at a P_H range of 6·5 to 8·5.

Schlutz (F. W.). **Systemic thrush in childhood.**—*J. Amer. med. Ass.*, cv, 9, pp. 650–653, 1935.

Full clinical details are given of four cases, three of which were fatal, of systemic thrush (associated with *Oidium* [*Candida*] *albicans*) [see preceding abstract] in female children, ranging in age from four months to eight years. Unusual features of the cases under discussion are dwarfing in two, generalized alopecia in three, and rapid sepsis in one (the infant), and all are of interest as illustrating the formidable nature

of the disorder when it assumes a systemic form and the poor results of any kind of treatment.

Robinson (G. W.) & Grauer (R. C.). **Use of autogenous fungus extracts in the treatment of mycotic infections.**—*Arch. Derm. Syph., Chicago*, xxxii, 5, pp. 787–794, 1935.

A report is given on the successful treatment of a number of persons suffering from mycotic infections (*Aspergillus*, *Trichophyton*, *Penicillium*, *Sporothrix*, and *Mucor* spp.) by autogenous extracts [cf. *R.A.M.*, xv, p. 93], the preparation of which is described. Stock extracts from *T. niveum*, *Microsporon villosum*, and *M. audouini* may be applied with satisfactory results where autogenous vaccines are unobtainable. One of the cases treated with an autogenous vaccine was that of a pulmonary infection due to *A. fumigatus* [ibid., xii, p. 289] in which a complete cure was effected.

Sawers (W. C.) & Thomson (E. F.). **Torulosis, with a report of a case of meningitis due to Torula histolytica.**—*Med. J. Aust.*, xxii (ii), 17, pp. 581–593, 6 figs., 1935.

Following a concise but comprehensive introductory survey of the literature on torulosis (believed to comprise 49 cases, mostly from America, up to December, 1934), and the classification, bacteriology, clinical manifestations, pathology, and other features of *Torula histolytica* [*Toralopsis neoformans* or *Cryptococcus hominis*: *R.A.M.*, xv, p. 153], the writers give full details of a fatal case of this disease (the fifth recorded for Australia) in a 26-year-old woman.

The organism isolated from the cerebro-spinal fluid was Gram-positive, ovoid or spherical, of typical yeast-like appearance, and forming true buds, often attached to small, lateral stalks. Cultures were readily obtained on a number of standard media at 37° C. and room temperature. The fungus produced acid from dextrose, levulose, sucrose, galactose, arabinose, and mannose, with small amounts from sorbite. There was no sign either of ascospores or mycelium. It was shown by laboratory experiments to be pathogenic to mice, rats, and (to a limited extent) to monkeys (*Macacus rhesus*), the symptoms induced being those of septicaemia.

A bibliography of 56 titles is appended.

Niño (F. L.). **Blastomicosis humana generalizada por Cryptococcus (n.sp.). (Estudio clínico, parasitológico, anatomopatológico y experimental.)** [Generalized human blastomycosis caused by *Cryptococcus* (n.sp.). (A clinical, parasitological, anatomopathological, and experimental study.)]—*Monogr. Univ. B. Aires Mis. Estud. Pat. reg. Argent.* 3, 162 pp., 13 pl. (12 col.), 125 figs., 7 graphs, 1934. [Received February, 1936.]

An exhaustive account, supplemented by a bibliography of 110 titles, is given of the writer's clinical, morphological, taxonomic, and physiological studies on, and animal inoculation experiments with *Cryptococcus psichrophylicus* n.sp., the agent of a fatal case of generalized

blastomycosis in a 60-year-old male of Spanish extraction, a preliminary note on which has already appeared [*R.A.M.*, xi, p. 644].

In the pus of the subcutaneous abscesses the organism occurred either singly or in groups of 2 to 4 spherical elements of very variable diameter (7 to 30 μ), and completely enveloped in a gelatinous, hyaline, double-contoured capsule 5 μ or more in thickness. In young cultures on solid or liquid media the organism measured 3 to 7 μ in diameter and was devoid of the capsule; it presented a typically yeast-like appearance and (under these conditions but not *in vivo*) stained readily by the Gram and May-Grünwald-Giemsa methods. The optimum temperature for the development of the fungus lies between 20° and 25° C.; it was destroyed at 37° but survived in the refrigerator at 10° and even on ice at 2°. On Sabouraud's agar the colonies are creamy-white, hemispherical, moist, and non-adherent; gelatine is not liquefied nor milk coagulated. No trace of hyphal formation could be detected on any of the media recognized as specially appropriate for this purpose, neither were asci produced. The fungus utilized maltose, glucose, arabinose, levulose, and galactose without gas production.

Two types of lesions may be induced by *C. psichrophylicus* both on man and as a result of inoculation experiments on laboratory animals, namely, specific inflammatory processes, and areas of intense histolysis. In all probability the pathogen is transported through the blood stream. As in the case of other blastomycoses the manifestations of *C. psichrophylicus* are both visceral and cutaneous.

Dragišić (B.) & Varićak (B.). **Vergleichende Untersuchungen über die toxische Wirkung des wässerigen Extrakts aus Ustilago maidis und der Mutterkornpräparate.** [Comparative investigations on the toxic action of the aqueous extract of *Ustilago maydis* and that of the ergot preparations.]—*Arch. exp. Path. Pharmak.*, clxxix, 3, pp. 319–326, 1 fig., 1935.

On the basis of comparative feeding experiments on mice with an aqueous extract of *Ustilago maydis* [*U. zeae*: *R.A.M.*, xv, p. 12] (Jugo-Slavian spore material, six months old) and commercial preparations of rye ergot [*Claviceps purpurea*: ibid., xv, p. 154], the writers conclude that the former is a great deal more toxic than ergotamine tartrate and ergotin Merck. The general similarity of the symptoms induced by the two substances point to the presence in the maize smut material of very large quantities of ergotamine-like substances. These results are considered to be of importance in relation to the etiology of juvenile acrodynia, in which *Ustilago* poisoning is believed in certain quarters to play a part.

Fabian (F. W.) & Severens (J. W.). **Moldiness in Romano Cheese.**—*J. Dairy Sci.*, xviii, 11, pp. 773–775, 1935.

Penicillium italicum was isolated from samples of Romano cheese prepared at a Michigan factory by a special procedure involving punching with a large number of holes to facilitate penetration by brine. It was experimentally ascertained that fungal infection could only occur in cheese with moisture and salt contents of 25 and below

6 per cent., respectively. It would appear inadvisable to puncture the cheese in the manner indicated, since all the samples so treated were contaminated, showing that the spores enter through the punctures.

HAWKER (LILIAN E.). **Further experiments on the Fusarium bulb rot of Narcissus.**—*Ann. appl. Biol.*, xxii, 4, pp. 684–708, 2 diags., 1935.

This is a progress report of the results of experiments carried out at Slough in continuation of Gregory's investigations of the bulb rot of narcissus caused by *Fusarium bulbigenum* [*R.A.M.*, xii, p. 224; xiii, p. 366]. It was shown that under suitable moisture conditions and at fairly high temperatures (27° to 30° C.) the fungus is capable both in the storerooms and in the soil of entering and destroying the roots of all the *Narcissus* varieties tested, and also of entering the bulbs of susceptible varieties through the parasitized roots. Evidence at hand, however, indicates that in England temperatures are seldom favourable during the autumn for the penetration of the fungus into the bulbs through the young roots, but that such penetration may occur through the old roots at the end of the growing season, when soil temperature is likely to be more favourable for attack.

While a confirmation was found of Gregory's statement that the standard hot water treatment of the bulbs against eelworm (*Anguillulina dipsaci*), when carried out in the autumn, may lead to heavy losses caused by *F. bulbigenum* [loc. cit.], experimental treatment of narcissus bulbs, during the storage period, with hot water, to which spores of the fungus had been added, indicated that the bulbs pass through a phase of minimum susceptibility in late August and early September, i.e., at the time when the treatment is normally applied. A material reduction of the losses ensuing from hot water treatment in the presence of *F. bulbigenum* spores resulted from the addition to the water of 0·1 per cent. formalin. While no conclusive evidence has yet been obtained from extensive experiments with fourteen *Narcissus* varieties as to the effect of this addition of formalin to the hot water bath on the spread of the disease, it was amply shown that the incorporation of 0·5 to 1·5 per cent. formalin did not affect adversely the foliage, date of flowering, quality and number of flowers of the ensuing crop, or the increase in weight of the treated bulbs during the growing season, the effect often being beneficial. Steeping the bulbs in a cold 0·1 per cent. mercuric chloride solution for five hours led to a retardation by a few days of the date of flowering.

STRAUCHMANN (H.). **Ein Knollen-Konservierungsmittel.** [A corm preservative.]—*Blumen- u. PflBau ver. Gartenwelt*, xxxix, 45, p. 551, 1935.

Karsan, an effective preventive of storage rots of the potato [*R.A.M.*, xii, p. 718], is stated to have been applied to dahlia, begonia, and gladiolus corms at Erfurt with similarly beneficial results. The powder is hygroscopic and the opened tin should be placed in a warm atmosphere for some hours before use. Regular treatments at three- to four-weekly intervals are advisable.

WICKENS (G. M.). **Wilt, stem rot, and dieback of the perpetual flowering Carnation.**—*Ann. appl. Biol.*, xxii, 4, pp. 630–683, 2 pl., 3 figs., 3 diags., 1935.

In this paper the author gives a detailed account of his investigations from 1930 to 1934 of the stem rot and die-back diseases of glasshouse carnations in England, a preliminary report of which has already been noticed [*R.A.M.*, xiii, p. 515; cf. also ibid., xiv, p. 636]. Isolations from stem-rotted plants yielded at first various non-pathogenic species of *Fusarium*, but when made from the xylem and pith *Verticillium cinerescens* [loc. cit.] predominated, and during 1933, out of 120 plants examined 107 gave this fungus alone, 5 in combination with *F. culmorum*, 1 with *F. herbarum* [*F. avenaceum*], and 6 with *Fusarium* spp. *F. avenaceum* was also isolated once alone. During 1934 similar results were obtained from material from 16 nurseries, but in one nursery 19 plants only yielded a species provisionally identified by Wollenweber as *F. dianthi* [cf. ibid., xiv, p. 636], to the exclusion of the *Verticillium*. *F. dianthi* was also isolated occasionally from plants of other nurseries.

From the results of inoculation experiments [which are described in detail], the author concludes that the disease known to growers in England as 'stem rot' is a complex of three different diseases, namely, (*a*) stem rot caused by *F. culmorum*, *F. avenaceum*, and probably several other species of this genus, involving indiscriminate rotting of the cortex at the collar, with no extensive vascular discoloration, and occasionally killing the plant; these fungi were shown to have little power of attacking established carnation plants, even when artificially inoculated through wounds; (*b*) a wilt disease due to *F. dianthi*, involving vascular discoloration followed by a dry, 'shreddy' rot, and (*c*) the wilt caused by *V. cinerescens*, resulting in a brown discoloration of the vascular system of the collar and wilting of shoots without any later rotting of stem tissues. The last-named fungus is widely distributed and is mainly responsible for the heavy losses to carnation growers in England. It was shown to be capable in contaminated soil of infecting carnation plants through wounds at various stages of their development, from cuttings upwards. Under strictly experimental conditions it caused a typical wilt, developing chiefly in the water-conducting elements and producing no obvious rotting of the stem. The accompanying leaf chlorosis was rather less marked than in the *F. dianthi* wilt.

The disease commonly known as 'die-back' appears to be caused mainly by *F. culmorum*. In one experiment, however, inoculation with *V. cinerescens* also resulted in the development of a condition of the 'die-back' type, but it is not yet known to what extent this may occur in nature.

A brief description is given of the morphological and biological characters of the causal organisms. The optimum temperature for growth in culture was shown to be about 25° C. for *F. culmorum* and *F. avenaceum*, 29° for *F. dianthi*, and 20° for *V. cinerescens*. The last-named fungus failed to grow at 35° but not at temperatures as low as 1° to 5°, while *F. dianthi* grew strongly at 35° and not at all at 10°

Histological examination of carnation plants in the very early stages of infection showed the presence of *V. cinerescens* in parts of shoots well beyond the limits of any macroscopically visible internal or external lesions, while *F. dianthi* has not as yet been isolated from regions outside the limits of visible vascular discoloration. It was experimentally shown that heavy infection of carnation plants with *V. cinerescens* occurred at all the soil moistures tested.

In a discussion of possible means of control it is stated that infection of fresh crops may result from the presence of *V. cinerescens* in the top soil and subsoil of old beds, or may be introduced into new beds with apparently healthy cuttings taken from infected stock, thus rendering top and [illegible]fection of carnation beds ineffective. The adoption of raised beds with the subsoil separated by a layer of cement and sterilization by heat or chemicals are stated to have met with considerable success, while the use of cuttings from healthy stock grown in a special house has also resulted in a striking reduction in the percentage of infected plants. It is recommended that a search for resistant strains should be made among the numerous seedlings which are raised by specialists for the production of new varieties of the carnation.

Brown (W.). **Stem-rot disease of the perpetual-flowering Carnation.**—*Gdnrs' Chron.*, xcviii, 2546, pp. 267–268, 1935.

Following a comprehensive summary of G. W. Wickens's work on the stem rot of glasshouse carnations (chiefly *Verticillium cinerescens*) in England [see preceding abstract], the author states that heat sterilization of infected soil is effective in controlling the fungus provided the heat penetrates far enough into the subsoil, this being the practical difficulty of the method. The use of cement-floored beds and steam-sterilized soil has given highly satisfactory results, and chemical disinfection of the beds by formalin (5 galls. of 1 in 50 solution per sq. yd.) appears to be promising. The rearing of stock plants in a special house and taking cuttings only from one-year-old plants are being successfully adopted.

Scholz (W.). **Über die Chlorose der Hortensie (Hydrangea hortensis) in ihrer Beziehung zum Eisen.** [On *Hortensia* (*Hydrangea hortensis*) chlorosis in its relation to iron.]—*Z. PflErnähr. Düng.*, A, xli, 3–4, pp. 129–164, 1935.

A comprehensive, fully tabulated account is given of the writer's experiments at the Friedrich Wilhelm University, Breslau, Silesia, on iron availability in relation to chlorosis, a very serious disease of *Hydrangea hortensis*, which may develop the symptoms at any stage of its growth. The disturbance is thought to originate in an excess of lime, which impedes the solubility of the iron in the soil and prevents its ready assimilation by the plant. Analyses of the affected leaves have shown them to be neither excessively rich in lime nor notably deficient in iron but the uniform distribution of the mineral through the foliage is hindered, with the result that it accumulates in the basal leaves, while the young growth shows a chlorotic discoloration. The addition of iron to the fertilizer relieved the chlorotic symptoms but

failed to increase the dry weight production, which remained abnormally low.

Scholz (W.). **Über die Chlorose der Becherprimel (Primula obconica Hance) in ihrer Beziehung zum Eisen.** [On chlorosis of the goblet Primula (*Primula obconica* Hance) in its relation to iron.]—*Z. PflErnähr. Düng.*, A, xli, 5–6, pp. 275–282, 1935.

Like the hydrangea [see preceding abstract], *Primula obconica* is highly susceptible to lime-induced chlorosis associated with iron deficiency or unavailability [*R.A.M.*, v, p. 669], and the writer's experiments indicated that both plants respond similarly to the inclusion of iron in the fertilizer.

Neis (W.). **Beobachtungen über den Löwenmaul-Rost.** [Observations on Snapdragon rust.]—*Blumen- u. PflBau ver. Gartenwelt*, xxxix, 46, p. 562, 1935.

Since 1934 *Puccinia antirrhini* is stated to have caused heavy damage to the snapdragon [*Antirrhinum majus*] plantings in the Treves district of Germany [*R.A.M.*, xiv, p. 447], the lower side of the leaves being so densely covered with pustules that the spores are broadcast in cutting the flowers or passing along the rows. The disease does not appear until towards the end of July [cf. next abstract], so that the first crop may be gathered without fear of infection. Attempts to combat the rust by the repeated application of Bordeaux mixture proved fruitless.

Laubert (R.). **Weitere Betrachtungen über den Löwenmaulrost.** [Further observations on the Snapdragon rust.]—*Blumen- u. PflBau ver. Gartenwelt*, xxxix, 47, p. 574, 1935.

In the Mülheim (Ruhr) district of Germany the spread of snapdragon (*Antirrhinum majus*) rust (*Puccinia antirrhini*) appeared to be less rapid in 1935 than in 1934, the first attacks being detected at the beginning of September [cf. preceding abstract]. The disease is by no means confined to the newly introduced American types and in many cases the yellow-flowering varieties appeared to be singled out for attack. Inoculation experiments with the rust gave positive results after an incubation period of a fortnight on healthy *A. majus* plants, but the wild *A. orontium* [*R.A.M.*, xiv, p. 364] proved highly resistant, eventually succumbing only after 25 days when the healthy infected plants were kept for some days under a bell-jar; this species, therefore, is unlikely to constitute a serious source of contamination.

Mains (E. B.). **Rust resistance in Antirrhinum.**—*Phytopathology*, xxv, 11, pp. 977–991, 2 figs., 1935.

Continuing his studies on the possibilities of breeding snapdragons (*Antirrhinum majus*) for resistance to rust (*Puccinia antirrhini*) [see preceding abstracts] in the United States [*R.A.M.*, iii, p. 721], the writer found that most of the commonly cultivated species and varieties are very susceptible to the disease. A few selections were obtained, however, showing some degree of resistance, and by means of self-pollination and selection some highly resistant types have been evolved.

In 1927, for instance, resistant plants of *A. glutinosum* were crossed with the resistant strain, GWD1, of Giant White. The F_1 plants were all extremely resistant; in the F_2 segregation into 45 highly resistant, 40 moderately resistant, and 11 very susceptible took place. In 1932 two cases (9 1–3 and M12) of clear-cut separation into an extremely resistant and a very susceptible group were obtained, and in the next year five lines proved to be homozygous for marked resistance. The flowers of these hybrids are white, but somewhat smaller and narrower than those of the Giant parent. In 1932 several crosses were made between the most outstanding resistant segregates of 9-1-3 lines and susceptible commercial types, two of which yielded in the F_1 highly resistant and very susceptible segregates in the ratios of 10:11 and 12:14, while one produced only highly resistant individuals. The F_2 from three resistant F_1 plants consisted of 290 resistant and 101 susceptible, closely approximating to a ratio of 3:1, from which it appears that the marked resistance of the 9-1-3 lines is due to a simple dominant factor [ibid., xiv, p. 172]. Crosses between the highly resistant *A. ibanjezii* Cartagena and a susceptible pink commercial snapdragon yielded 21 uniformly resistant plants, while the F_2 segregated into 113 extremely resistant and 32 very susceptible, again denoting a simple dominant factor for resistance. Species of the related genera *Linaria* and *Adenostegia* [*Cordylanthus*] included in the tests were not attacked by *P. antirrhini*.

Preti (G.). **Una malattia dell' 'Antirrhinum majus' L. nuova per la micologia italiana ('Puccinia antirrhini' Dietel e Holway).** [A disease of *Antirrhinum majus* L. new to Italian mycology (*Puccinia antirrhini* Dietel & Holway).]—*Riv. Pat. veg.*, xxv, 9–10, pp. 361–372, 5 figs., 1935.

In the spring of 1935 snapdragon (*Antirrhinum majus*) rust [*Puccinia antirrhini*: see preceding abstracts] not previously recorded in Italian literature killed off a number of plants growing in a private garden in Florence, where the disease had been observed but not identified in the preceding November. The disease, which was probably introduced on seed imported from London, was confined to a few gardens in proximity to that in which the original infection occurred. Volunteer plants in the vicinity later became affected. The control measures recommended consist in the destruction of the affected plants, spraying with a copper mixture of not over 1 per cent. concentration or dusting with sulphur, and the selection of resistant varieties.

Wieringa (K. T.). **Een bacterieziekte voorkomende bij Begonia's.** [A bacterial disease occurring among Begonias.]—*Tijdschr. PlZiekt.*, xli, 11, pp. 309–313, 1 pl., 1935.

An account is given of a bacterial disease affecting begonias in Holland, the large-flowered varieties being particularly susceptible while Gloire de Lorraine is more rarely attacked. Small, water-soaked lesions originate near the leaf edges and gradually spread over the whole surface, ultimately involving the petioles and stems, which soften and turn black, whereupon the stem collapses. The diseased

leaves become brown and shrivelled. The yellow slime exuded from the petioles and stems is composed of non-motile bacteria, 3 to 5 by 0·5 μ, forming on meat bouillon- or yeast extract-agar sulphur-yellow colonies with entire margins, liquefying gelatine, producing acid from glucose, saccharose, and lactose, splitting starch and casein, not fermenting or reducing nitrates. Yeast extract-agar was found to be a particularly favourable medium, but good growth also occurred in a synthetic inorganic solution with 1 per cent. glucose. The organism is evidently not exacting in its food requirements and is probably capable of developing in the soil. The optimum temperature for growth is 28° C. The bacterium differs from the agent of a similar disease of begonias in Denmark [*Bacterium begoniae*: *R.A.M.*, xiii, p. 308] in its non-motility, and is regarded as a new species to which the name *Phytomonas flava begoniae* is given.

At Aalsmeer a peculiar gloss on the leaves was considered by a local grower to be a sure sign of the bacterial disease, of which a leaden tint on the foliage is also frequently characteristic. In both these cases the typical leaf spots may be absent and infection presumably occurs through the vascular bundles of the stem. The bacteria are probably spread to some extent by the implements used in cultural operations as well as by the planting of cuttings in infested soil. Pending further studies on the conditions promoting infection by *P. flava begoniae* the best hope of control lies in the selection of healthy mother plants and scrupulous care in the handling of the cuttings.

White (R. P.) & Hamilton (C. C.). **Diseases and insect pests of Rhododendron and Azalea.**—*Circ. N.J. agric. Exp. Sta.* 350, 23 pp., 2 pl., 1935.

Popular notes are given on the symptoms, etiology, and control by an appropriate spray schedule of a number of rhododendron and azalea diseases, including (apart from those noticed from another source) [*R.A.M.*, xii, p. 696] chlorosis (curable by the application of 0·25 per cent. ferrous sulphate), *Exobasidium burtii* and *E. vaccinii-uliginosi* [ibid., xiv, pp. 65, 174], and *Phytophthora cryptogea* (on *R. maximum*, *R. catawbiense*, and *R. carolineanum*).

Dodge (B. O.). **A bacterial disease of Delphinium ajacis.**—*J. N.Y. bot. Gdn*, xxxvi, 431, pp. 257–260, 2 figs., 1935.

In July, 1935, a bed of *Delphinium ajacis* at the New York Botanic Garden was observed to be affected by a destructive disease causing severe stunting and a soft, malodorous rotting of the tops, the root system apparently remaining healthy. When the stems of infected plants were split down to the base they showed an irregular, streaky, black discoloration of the pith, most of which was disintegrated, and mucilaginous masses of bacteria were exuded from the tissues, while masses of long, thin crystals accompanied the organism reminiscent of those associated with the agent of gladiolus scab (*Bacterium marginatum*) [*R.A.M.*, iv, p. 287 *et passim*]. Promising results in the control of the disease, further investigations on which are in progress, were given by spraying with Bordeaux mixture, also recommended for the control of 'blacks' [*Bact. delphinii*: ibid., iv, p. 480; xiii, p. 356], a

purely local black spotting of the leaves, occasionally involving the flowers and stems.

LINDEGG (GIOVANNA). **Cancro picciolare dell' Acanto 'Acanthus mollis' L.** [Petiole canker of *Acanthus, Acanthus mollis* L.]—*Riv. Pat. veg.*, xxv, 5–6, pp. 229–236, 2 figs., 1935.

When *Acanthus mollis* plants inadvertently kept during winter in rather cold, damp conditions under glass in Italy were removed from the pots the leaf stalks snapped off at the base leaving the plants almost denuded of their outer leaves. A depressed, blackish, canker-like lesion measuring up to 5 by 2½ cm. was present at the point of rupture, and sporodochia were observed in the thick weft of hyaline, septate, simple or branched hyphae covering the affected tissues. The simple, occasionally branched, or, more often, bifid, hyaline conidiophores measured 20 to 28 by 4 μ and were sharply pointed at the apex. The hyaline to faintly pink, cylindrical-fusoid, slightly curved conidia measured 8 to 12 by 3·7 to 4 μ, and were rounded at the ends. The fungus is named [with a Latin diagnosis] *Fusoma calidariorum* Sacc. var. *acanthi* n.var.

GANTE (T.). **Die Schorfkrankheit des Feuerdorns.** [The scab disease of *Pyracantha.*]—*Blumen- u. PflBau ver. Gartenwelt*, xxxix, 47, p. 573, 2 figs., 1935.

The popular shrub, *Pyracantha coccinea* [*Crataegus pyracantha*], is stated to suffer considerable damage in the Geisenheim (Rhine) district of Germany from scab (*Fusicladium pirinum* var. *pyracanthae*) [*R.A.M.*, viii, p. 268] the unsightly black spots of which spoil the decorative effect of the bright orange berries. The conidia of the fungus in the German material were found to measure 11 to 16 by 5 to 8 μ and are thus appreciably shorter than those of *F. pirinum* [*Venturia pirina*] (20 to 30 by 5 to 9 μ). The disease is largely preventable by giving the shrubs ample space and planting them in a sunny situation.

KLEBAHN (H.). **Einige Beobachtungen und Versuche über den Mahonia-Rost.** [Some observations and experiments on the *Mahonia* rust.] —*Z. PflKrank.*, xlv, 11, pp. 529–537, 3 figs., 1935.

In discussing the rapid spread of *Uropyxis mirabilissima* (*Cumminsiella sanguinea*) [*R.A.M.*, xiii, pp. 185, 447] in Europe, the author suspects that the disease, first observed by Zimmermann in 1927 [ibid., ix, p. 787] at Rostock, may have been introduced with the plants in 1910 or 1912, since a neighbouring garden was free from the disease; spread appears to be effected even more by nursery stock than by natural factors, for many plantings have been found free from infection in diseased areas. Observations and experiments [details of which are given] showed that aecidia of *Puccinia graminis* are formed on *Mahonia* fruits but not those of *C. sanguinea* which occurs only on the leaves. An exsiccatum of aecidia on *Mahonia* leaves contained in Sydow's Uredinales (No. 1819) showed, on careful examination of the material, the presence of spores of *P. graminis*, with the characteristic thickening of the wall, and those of a fungus comparable with *C. sanguinea*, without this feature. The spores from the fruits (No. 2122) show a distinct thickening and are therefore referable to *P. graminis*.

The aecidia of the rust collected by the writer on *Mahonia* leaves measured 135 to 170 by 120 to 160 μ, compared with 140 to 150 by 150 μ in Sydow's material, the corresponding dimensions for those on *Berberis* leaves (Pfeiffer v. Wellheim's specimen) and *Mahonia* fruits being 260 to 300 by 170 to 250 μ and 225 to 235 by 250 to 260 μ, respectively.

It cannot be decided from these data whether exsiccatum 1819 is identical with *P. graminis* or *C. sanguinea*, though the balance of evidence is perhaps in favour of the latter, and the occurrence of *C. sanguinea* in Mark Brandenburg in 1903 still remains therefore a matter of uncertainty.

Jenkins (Anna E.) & Ukkelberg (H. G.). **Scab of Goldenrod caused by Elsinoe.**—*J. agric. Res.*, li, 6, pp. 515–525, 7 pl., 1 map, 1935.

An account is given of a scab of golden rod (*Solidago* spp.), which was first noticed in 1933 in the Edison Botanic Garden at Fort Myers, Florida (where they are being studied because of their high content in rubber), attacking the young growth of the plants which, however, usually attain maturity more or less normally, although new growth becomes infected as it develops. Occasionally young plants may be killed or stunted. Some of the leaves wilt and die as they unfold, while others that expand later may also be killed; in severe cases the stem may be practically devoid of leaves for several centimetres, though it usually remains alive even though girdled by the causal fungus. On the highly susceptible *S. sempervirens* the leaf spots occur more frequently on the under side, and often involve the midribs, veins, petioles, and the basal part of the sessile leaves. The leaf lesions range from punctiform to circular, subcircular or irregular spots up to 5 mm. in diameter, and may be depressed on one side and bulging out on the other. At first they are brown to madder-brown and water-soaked, later vinaceous buff, and finally white or grey. On the stems they are of the same colour but may be surrounded by a narrow dark line. On *S. edisoniana* and related species the leaf spots are circular to subcircular, 2 or 3 mm. in diameter, and more or less permanently hazel- or brick-red.

The causal fungus is considered to be a new species of *Elsinoe*, and is named *E. solidaginis* [with Latin and English diagnoses]. The ascomata are apparently intra-epidermal up to 150 μ in surface diameter and 50 μ thick, with a dark-coloured epithecium up to 20 μ thick; the asci are mostly spherical to obpyriform, 15 to 17 by 15 to 18 μ, occasionally with a small stipe; the ascospores are hyaline, 2- to 3-celled, and 8 to 13 by 4 to 5 μ. The *Sphaceloma* stage, which was observed in nature, has ovoid to oblong-elliptical conidia, 6·5 to 8·6 by 2·5 to 4 μ, germinating by means of a germ-tube or by the production of sprout conidia. The pathogenicity of the fungus to *Solidago* spp. was proved by inoculation experiments. The species known to be susceptible are *S. chapmani*, *S. edisoniana*, *S. elliottii*, *S. fistulosa* [Mill. = *S. pilosa* Walt.], *S. leavenworthii*, *S. mirabilis*, and *S. sempervirens*.

Evidence was obtained that the disease has been present in Fort Myers since at least 1930, and that it also occurs in Florida and Georgia.

YARWOOD (C. E.). **Heterothallism of Sunflower powdery mildew.**—*Science*, N.S., lxxxii, 2131, pp. 417–418, 1935.

Perithecial formation only on certain areas of diseased leaves and at the intersection of two mildew colonies indicated the probability of heterothallism in *Erysiphe cichoracearum* on sunflower (*Helianthus annuus*) [*R.A.M.*, xiii, p. 804]. Fifteen monoconidial cultures were isolated and maintained on excised sunflower leaves in a sucrose solution [cf. ibid., xiv, p. 174]. One of these cultures has been grown for over four months and all for six weeks or more under varied conditions without any sign of perithecial production, whereas the combination of certain cultures led to the formation of those organs. In two out of three tests with two of the cultures, 1 and 1A2, simultaneous inoculations on excised leaves floating on sucrose solution, and in all three trials with cut leaves with their petioles in flasks of a mineral nutrient solution perithecia were formed. In one test, all twelve inoculations either with 1 or 1A2 alone resulted in conidial formation only, while 17 out of 20 with the two cultures together gave perithecia as well. These data are considered to afford reasonable proof of heterothallism in *E. cichoracearum*, this being apparently the first record of the phenomenon in question among the Erysiphaceae.

POWELL JONES (A.) & MOORE (H. I.). **The honey fungus.**—*Gdnrs' Chron.*, xcviii, 2547, pp. 284–285, 1 fig., 1935.

Attention is drawn to the risks involved in the failure to destroy fallen trees or other débris infected by *Armillaria mellea*, which rapidly spreads to a large number of other hosts, 39 being listed, including fruits, vegetables, and ornamental shrubs. The more conspicuous features of the fungus, its life-history and mode of infection, are also described in semi-popular terms with special reference to the possibilities of prevention and control.

NUSBAUM (C. J.). **A cytological study of the resistance of Apple varieties to Gymnosporangium juniperi-virginianae.**—*J. agric. Res.*, li, 7, pp. 573–596, 1 pl., 4 figs., 1935.

An expanded account is given of the author's cytological studies of the development of artificially produced infections with apple rust (*Gymnosporangium juniperi-virginianae*) [*R.A.M.*, xv, p. 160] on the leaves of Wealthy (susceptible), Yellow Transparent (moderately resistant), Fameuse (resistant), and Baldwin (very resistant), apple varieties, an abstract of which has already been noticed [ibid., xiv, p. 368]. In addition to the results already given, the author states that in the Wealthy apple the injury to the host cells following penetration of the usually simple haustoria was slight, generally only resulting in a reduction in the number of plastids. Up to the tenth day, the fungus spread vigorously in all directions, especially in the spongy parenchyma, but coincident with the formation of pycnidia, the marginal spread almost ceased. In the vicinity of the pycnidia, the spongy parenchyma cells became hypertrophied, resulting in the obliteration of the large intercellular spaces and in the collapse of a portion of the lower epidermis, as well as of the haustoria in the broken-down cells.

In the leaves of the resistant varieties tested, the fungus died before any injury to the host cells occurred, and its failure to establish itself is attributed to antagonism of the host protoplasts and not to hypersensitiveness. Infections also usually failed to develop when young Wealthy leaves were inoculated on the dorsal surface, but in this case the failure is attributed to starvation, since the secondary invading hyphae usually shrivelled and collapsed before they could establish contact with the mesophyll cells. Finally, the complete resistance to the rust observed in old Wealthy leaves is thought to be due to physical properties of the epidermis.

PESANTE (A.). **Existence de formes ou de races biologiques dans 'Stromatinia fructigena' et 'Stromatinia cinerea'.** [The existence of biologic forms or races in *Stromatinia fructigena* and *Stromatinia cinerea*.]—*Boll. Sez. ital. Soc. int. Microbiol.*, vii, 10, pp. 383–388, 1935.

In the autumn of 1934, the author isolated numerous strains of *Stromatinia* [*Sclerotinia*: *R.A.M.*, xiii, p. 34] from ripe apple, pear, peach, and quince fruits and in the spring from withered apricot branches and flowers; most of the strains obtained from the fruits belonged to *S. fructigena*, while those from apricot branches and flowers belonged, respectively, to two different strains of *S. cinerea* [*S. laxa*: ibid., xv, p. 159]. Of two other strains obtained from apple fruits one agreed perfectly with *S. laxa* in its conidial measurements and cultural characters, while the other appeared to be intermediate between *S. laxa* and *S. fructigena*.

The different strains of *S. fructigena* and *S. laxa* differed widely from one another in their cultural characters on various media. Many more strains of *S. fructigena* were isolated than of *S. laxa*, and on carrot agar a series of cultures of the former was obtained, varying from strains showing a stroma of average consistency with only traces of conidia, to strains in which the entire surface of the culture was covered with them. On Czapek's agar the strains of *S. fructigena* obtained ranged from those lacking any brown mycelium to others where such mycelium covered the whole surface of the colony. In some cases true sclerotia were produced.

Artificial inoculations of ripe apples with a strain of *S. laxa* from apple and with various strains of *S. fructigena* caused different amounts of flesh-blackening; the conidial pustules that formed also differed widely in number and appearance, some being compacted and others cottony. The strain of *S. laxa* used produced a very diffused discoloration with traces of aerial mycelium, but no conidia. That each species comprises a number of races was confirmed by the use of monoconidial cultures from some of the strains. Further experiments on various media afforded additional proof of the constant cultural behaviour and individuality of the various strains.

MITRA (A.). **Investigations on the wound parasitism of certain Fusaria.** —*Indian J. agric. Sci.*, v, 5, pp. 632–637, 1 pl., 1935.

Artificial inoculations by the cork-borer method [*R.A.M.*, ix, p. 391] or an adaptation of it on 'hill' and Kashmir apples and potato tubers

with *Fusarium camptoceras* [ibid., xiv, p. 472], *F. solani* var. *medium*, *F. diversisporum*, *F. semitectum*, *F. semitectum* var. *majus*, and *F. moniliforme* [*Gibberella moniliformis*] showed that on apples the last-named caused much rotting of both varieties (average percentage of rot, 22·01), while *F. solani* var. *medium* produced an average of only 1·44 per cent. damage, and *F. camptoceras*, *F. semitectum*, and *F. semitectum* var. *majus* were harmless. That the rots were due to the fungi used was verified by re-isolating them from the infected fruit. Potatoes were attacked only by *F. solani* var. *medium*, which caused a dry rot. Saltants exhibited the same parasitic activities on potatoes as their respective parents.

Arnaud (G.) & Barthelet (J.). **Essais de traitements des arbres fruitiers et de la Vigne en 1935.** [Experiments with treatments of fruit trees and Vines in 1935.]—*C.R. Acad. Agric. Fr.*, xxi, 29, pp. 1094–1100, 1935.

In experiments on the control of pear scab (*Venturia pirina*) at the Versailles Phytopathological Station [*R.A.M.*, xiv, p. 454], of three applications of Bordeaux mixture made on 10th April, 6th May, and 21st June, the third was the most efficacious and there was comparatively little difference between the trees receiving this treatment alone and those given all three. This is a very unusual observation, the first treatment being normally the most effective. Theoretically, it is inadvisable to spray an orchard in blossom, but in practice the writers have observed little or no injury among trees so treated. Attention is drawn to the occurrence of scab lesions, up to 5 or 6 cm. in length, situated some 20 cm. from the base of the shoot, on the branches of the Doyenné du Comice variety, the fruit of which is resistant. Late scab was of very little importance at Versailles in 1934.

Neither copper oxychloride nor copper sulphate plus 1 gm. vanadic acid per hectol., as recommended by Branas and Dulac to eliminate the tendency to burning and increase adhesion, proved equal to ordinary Bordeaux mixture in the control of vine downy mildew (*Plasmopara viticola*), though both gave fairly good results.

Cation (D.). **One spray controls Peach leaf-curl.**—*Quart. Bull. Mich. agric. Exp. Sta.*, xviii, 2, pp. 86–88, 1935.

A popular note is given on the symptoms of peach leaf curl (*Taphrina deformans*) and its control under the meteorological conditions prevailing in Michigan, where attacks may be expected in at least three out of five years. Complete prevention of infection is stated to be practicable by the application of either a dormant spray (1st March to 1st April) of 5 in 100 lime-sulphur or an autumn treatment with 8–8–100 Bordeaux mixture.

Capucci (C.). **Osservazioni sulla resistenza di alcune varietà di Pesco all' Exoascus deformans.** [Observations on the resistance of some Peach varieties to *Exoascus deformans*.]—*Romagna agric. zootec.*, 6–7, pp. 155–162, 1935. [Abs. in *Riv. Pat. veg.*, xxv, 9–10, pp. 398–399, 1935.]

During a very severe outbreak of leaf curl (*Exoascus* [*Taphrina*]

deformans) [*R.A.M.*, xiv, p. 594] in Italy in 1934, which had been favoured by neglected or careless spraying, the following peach varieties remained entirely unaffected: Fior di maggio, Bonfiglioli rossa, Bella di Roma tardiva, S. Anna piccola, Buco incavato, Tardivo di Massa Lombarda, and Krummel October. The Amsdem variety was very resistant.

KADOW (K. J.) & ANDERSON (H. W.). **The role of zinc sulphate in Peach sprays.**—*Bull. Ill. agric. Exp. Sta.* 414, pp. 207–255, 8 figs., 1 graph, 1935.

Peach trees in Illinois sprayed five times at fortnightly intervals during summer with lead-lime (3–6–100), lead-lime-zinc (3–8–8–100), the same (3–8–4–100) with the fifth application omitted, and lime-zinc (8–8–100) showed, respectively, 1·2, 2·6, 1·8, and 2·05 per cent. scab (*Cladosporium carpophilum*) [*R.A.M.*, xiv, p. 683], as compared with 23·1 per cent. in the untreated control plot. This result indicates that as a fungicide zinc sulphate possesses no particular advantage over lead arsenate-lime, though either lead-lime or lead-lime-zinc is adequate for commercial control of the disease under average conditions.

In laboratory tests zinc sulphate was slightly toxic to the germination of the spores of *Sclerotinia fructicola*. For both diseases sulphur appears to be a much more effective fungicide than zinc sulphate-lime.

The amounts of bacterial spot (*Phytomonas* [*Bacterium*] *pruni*) [ibid., xiv, pp. 641, 682] that developed on the trees given the first, second, and fourth treatments mentioned above were, respectively, 6·25, 5·4, and 5·95 per cent., as compared with 5·9 per cent. in the control plot. The evidence obtained showed that zinc sulphate in spray mixtures prevents the cracking and corky tissue formation that generally results when fruit affected by *Bact. pruni* is treated with lead arsenate-lime sprays. Lime alone was more toxic to the growth of *Bact. pruni* in culture than zinc sulphate, lead arsenate, or any combination of all three. These results, together with general field observations, are considered to show that zinc sulphate, however used, is a very poor bactericide, and that zinc sulphate-lime sprays, applied specifically against *Bact. pruni*, are probably valueless.

Details are also given of the authors' investigations into the effect of zinc on peach growth and the use of zinc sulphate as a corrective for lead arsenate spray injury. Applied as a nutrient solution to peach seedlings growing in purified quartz sand, zinc sulphate measurably increased growth, though on seedlings in Carrington silt loam soil it had practically no effect.

DU PLESSIS (S. J.). **Groen-verrotting van Appelkose en terugsterf van Appelkoosboomtakkies veroorsaak deur Sclerotinia sclerotiorum (Lib.) Mass.** [Green rot of Apricots and die-back of Apricot branches caused by *Sclerotinia sclerotiorum* (Lib.) Mass.]—*S. Afr. J. Sci.*, xxxii, pp. 238–245, 4 figs., 1935.

Green rot of apricots (*Sclerotinia sclerotiorum*) [*R.A.M.*, xiv, p. 315] was first observed in South Africa in 1924, and in 1932 the writer found it to be very prevalent in the Wellington district of Cape Province, where the fruit is extensively grown. The fungus also causes a die-back

of the young branches, in which it is capable of persisting until the following season, so that the removal of infected material during pruning operations is an important measure of control. Infection of the branches can take place only through wounds or through the pedicel of a rotted fruit. Sclerotia have not been detected on diseased wood in the open but may develop on material transferred during the current season to a moist atmosphere. The actual site of infection is limited to a small area, the rest of the branch dying off in consequence of the emission of toxic substances by the fungus.

Tranzschel (V.). **La ruggine del Ciliegio: 'Leucotelium cerasi' (Béreng.) n. gen. n. comb. ('Puccinia cerasi' Cast.) ed il suo stadio ecidiale.** [The Cherry rust: *Leucotelium cerasi* (Béreng.) n. gen. n. comb. (*Puccinia cerasi* Cast.) and its aecidial stage.]—*Riv. Pat. veg.*, xxv, 5–6, pp. 177–183, 1935.

After pointing out that *Puccinia cerasi*, recorded in Italy on cherry, *Prunus avium*, peach, myrobolan (*P. cerasifera*), and *P. spinosa*, has hitherto been known only in its uredospore and teleutospore stages (the latter appearing in autumn and germinating shortly after), and that as all these hosts shed their leaves in autumn the basidiospores must infect some other plant on which the aecidia develop in spring, the author states that aecidia morphologically resembling those of *Tranzschelia* [*Puccinia*] *pruni-spinosae* [*R.A.M.*, xiv, p. 676] have been found on *Eranthis hiemalis* in the same localities as *P. cerasi*. Inoculation experiments [which are described] with aecidiospores from *Eranthis* on cherry and *Prunus padus* gave positive results and in other tests, *Puccinia cerasi* from cherry infected *Prunus avium*, *P. fruticosa*, *P. nana*, cherry, plum, apricot, *P. padus*, *P. virginiana*, and *P. maackii*.

The spermagonia found on *E. hiemalis* being subcuticular cannot belong to a *Puccinia*, in which these organs are immersed in the mesophyll; on the other hand, the teleutospores of *P. cerasi* differ from those of *Tranzschelia* in their colourless epispore and autumnal germination. The author therefore considers that *P. cerasi* does not belong to *Tranzschelia*, and transfers it to a new genus [provided with a Latin diagnosis] *Leucotelium* as *L. cerasi*, the closely related *P. padi* and *P. pruni-persicae* [ibid., xii, p. 248] being added as *L. padi* and *L. pruni-persicae*. The new genus lies between *Tranzschelia* and *Ochrospora*, the aecidia resembling those of the former, while the above-mentioned teleutospore characters bring it near to the latter. [A Russian version of this paper occurs in *Советская Бот.* [*Sovetsk. Bot.*], *1935*, 4, pp. 80–84, 2 figs., 1935.]

Goetz (G.). **Einiges über die Johannisbeer-Welkekrankheit.** [Notes on the Currant wilt disease.]—*Obst- u. Gemüseb.*, lxxxi, 11, p. 172, 1 fig., 1935.

Popular notes are given on the symptoms, etiology, and control of currant wilt (*Verticillium albo-atrum*), which is stated to have been steadily increasing during the last twenty years in Germany [*R.A.M.*, xii, p. 117]. Red and white varieties are chiefly affected, the black ones being generally resistant. Diseased bushes—recognizable by their yellow foliage and shrivelled branches—should be removed and burnt

immediately on detection. *V. albo-atrum*, in addition to attacking a number of cultivated plants, also occurs on various weeds, e.g., deadly nightshade [*Solanum nigrum*], goosefoot [*Chenopodium*], and stinging-nettle [*Urtica*], the eradication of which in currant plantings is therefore important.

PADY (S. M.). **The role of intracellular mycelium in systemic infections of Rubus with the orange-rust.**—*Mycologia*, xxvii, 6, pp. 618-637, 42 figs., 1935.

Continued studies of the *Rubus* orange rust (*Gymnoconia interstitialis*) [*R.A.M.*, xiv, p. 642] showed that the aecidiospores of the two short-cycle strains of the rust germinate readily after being dusted on the very young leaves and shoots (about ½ in. in length) of blackberries and *R. occidentalis*, and produced fully formed promycelia of two and four cells, respectively, within 24 hours. Germination of the basidiospores follows immediately after their detachment from the basidia; the host epidermis is penetrated by a short germ-tube, which forms a typical penetration hypha; the latter produces intracellular branches which enter adjacent cells through the side wall, after which the entering hypha cuts off a terminal cell, and the subterminal cell gives rise to a branch which the author terms the primary runner. The terminal cell then divides, and a secondary runner is formed from the new subterminal cell; this cell is considerably enlarged with a characteristic rounded base, while the terminal cell continues to grow, becoming more or less compactly coiled and multicellular. The runners enter neighbouring host cells, where the same process is repeated, the result being a highly characteristic intracellular mycelium which, so far as the author is aware, has not yet been reported in other rusts. The mycelium continues to grow in this way through the cortex into the vascular bundles and the pith. From the tenth day from inoculation onward and continuing throughout the season, strands of intercellular mycelium begin to be formed in the phloem, arising from one of the runners, usually the primary one, which grows into the middle lamella and the intercellular spaces. The intercellular mycelium develops rapidly in the phloem, and becomes perennial in the host canes and roots. The intracellular mycelium, on the other hand, grows but little, if at all, during the next spring, and there is evidence that it degenerates later. Its function is apparently that of establishing the fungus in the host, and is probably haustorial in nature.

NOLAN (R. E.). **A root rot of Strawberry caused by a species of Diplodia.**—Abs. in *Phytopathology*, xxv, 10, p. 974, 1935.

A *Diplodia* of the *natalensis* group has been isolated from strawberries affected by a destructive root rot [in Florida]. Infection commences as a small, dark brown spot on the roots and progresses rapidly; infected roots may break off near the point of attack, but the symptoms proceed up to the plant. Inoculated plants are killed in six to ten days during hot weather. The disease was shown by soil temperature experiments to reach a climax at temperatures above 80° F. The *Diplodia* under observation is more active than *D. frumenti* in attacking

maize [*R.A.M.*, xiv, p. 564], while of the species used for comparison, *D. natalensis* was the most pathogenic to strawberries.

WILCOX (R. B.) & BECKWITH (C. S.). **The false-blossom disease of Cranberries.**—*Circ. N.J. agric. Exp. Sta.* 348, 4 pp., 1935.

Popular notes are given on the symptoms, mode of transmission, and control of false-blossom disease of cranberries in New Jersey [*R.A.M.*, xiv, p. 776]. In order to prevent the introduction and spread of the disorder, it is imperative to select healthy stock and to keep the plantings free from infection by systematic roguing. The insect carrier of false blossom, the blunt-nosed leaf-hopper [*Euscelis striatulus*], may be exterminated by the application of appropriate entomological measures [which are described in detail]. The practice of flooding, sometimes adopted for this purpose, should not be too often repeated where fungal rots are liable to become severe.

MAGEE (C. J.) & EASTWOOD (H. W.). **Corm rot of Bananas.**—*Agric. Gaz. N.S.W.*, xlvi, 11, pp. 631–632, 2 figs., 1935.

Banana corm rot, which has been present in New South Wales for some years, has recently become of greater importance in this locality as a result of the extension of banana planting to hardwood forest areas.

The condition, primarily a disease of new plantations on recently cleared land, is apparently caused by a species of *Clitocybe* [*R.A.M.*, xi, p. 382] and a number of undetermined Basidiomycetes [ibid., xii, p. 552; xiii, p. 251] which, after the trees have been felled, pass from the stumps and roots to the young banana plants, penetrate the roots and corms at or below ground-level, and spread towards the centre of the corm. The aerial parts of the banana plants show no marked symptoms until the fungi have obtained a good hold on the corm and roots, when the leaves turn yellow and collapse at their junction with the pseudostem. In advanced stages the plant is easily pushed over; it generally breaks off cleanly at or just above ground-level, showing a dry, brown corm with white fungous threads interwoven throughout.

Control consists in digging out and burning the infected stools and opening up the holes. Replacing individual plants is not recommended but, if done, planting should be effected some feet away from the infected site. When found, the original infection centres should also be destroyed. In a new plantation all roots should be removed from the vicinity of the set by digging large holes. Severely affected areas should not be treated piecemeal but replanted as a whole.

HORNE (W. T.) & PALMER (D. F.). **The control of Dothiorella rot on Avocado fruits.**—*Bull. Calif. agric. Exp. Sta.* 594, 16 pp., 3 figs., 1935.

The rot of avocado fruits caused by *Dothiorella gregaria*, the imperfect stage of *Botryosphaeria ribis* [var.] *chromogena* [cf. *R.A.M.*, vii, p. 621; xii, p. 79; xiv, pp. 196, 707] occurs in California probably wherever this host is cultivated, but causes serious losses only on fruit grown in certain coastal areas. Infection does not usually occur until after picking, when the softening process has begun. In typical cases

seen on Fuerte fruits at the stage known as 'breaking' (i.e., when the softening first becomes detectable) small dark spots with vague boundaries appear, new dark areas developing as the softening progresses. Spots under $\frac{1}{8}$ in. in diameter are light umber, vaguely bounded, and not sunken or distinctly marked. They often spread out as a pale margin from a speckle or blemish. As they become more distinct they darken slightly, but in the early stages are not black. They may reach $\frac{1}{2}$ in. in diameter in three or four days, when they are circular, not sunken, and rather uniformly pale. After this they spread more rapidly and become soft, sunken, and uneven, a watery rot advancing slowly into the flesh. A rank odour develops, and sometimes the rotting fruits fade to a greenish-grey. The surface settles and becomes uneven, after which the whole fruit shrivels up and becomes dark. The surface shows numerous small protrusions at the tips of which minute spore masses may appear as drops or coils, emerging from pycnidia; similar structures are found in the dead areas of tip-burned leaves and the bark of dead twigs.

Infection of the fruit is effected through the stomata, and the fungus makes considerable growth in the air-space below but is unable to penetrate farther until the fruit begins to soften. The difficulty of preventing the rot by treating the surface of harvested fruit is due to the protection afforded to the fungus by these air-spaces.

In the coastal areas of California the Fuertes avocado blossoms and sets fruit chiefly from March to May, but many 'off blooms' are set at other times. These do not mature with the principal crop, and have in the past been allowed to become senile, with the result that they failed to soften normally when picked. In such fruits the rot often developed early, the whole surface rotting before the inner flesh was completely soft.

Various treatments designed to destroy the spores on the fruit surface were unavailing. Four years' orchard-spraying tests were then carried out under commercial conditions, the fruit being handled in the same way as other consignments except that it was allowed to soften in the packing-house instead of being distributed to the markets. The data obtained showed that applications of Bordeaux mixture with flotation or wettable sulphur added gave complete control in 1932 and 1933, with only 0·5 per cent. infection against 54 per cent. in the controls in 1934, wettable sulphur giving the next best control (in the 1934 trials) with 4 per cent. infection. The authors recommend that where no cyanide fumigation is to be carried out the fruit should be sprayed when about $1\frac{1}{2}$ in. in diameter and again about two months later with a mixture of 16 lb. Bordeaux powder (or Bordeaux mixture 4–4–50), 6 lb. wettable sulphur, and 6 oz. blood albumin spreader in 100 galls. water. Where fumigation is necessary, it should be effected as soon as the fruit reaches $1\frac{1}{2}$ in. in diameter, and be followed at once by spraying with 6 lb. wettable sulphur and 6 oz. blood albumin in 100 galls. water, at least one further similar application being made six to eight weeks later. As a combined treatment for this disease and mottle leaf [ibid., xv, p. 146] the formula recommended is 16 lb. zinc sulphate crystals, 1 lb. copper sulphate, 8 lb. hydrated lime, 6 lb. flotation sulphur, and 6 oz. blood albumin in 100 galls. water; the

first spray should be applied when the fruit is about 1½ in. in diameter, and the second about two months later, fumigation, if practised, preceding the first spraying.

Azevedo (N.). **A 'variola' do Mamoéiro.** [Papaw pox.]—*Rodriguésia*, i, 2, pp. 91–93, 3 pl., 1935.

In Brazil all varieties of papaw are susceptible to a leaf-spot attributed to *Asperisporium caricae* [*R.A.M.*, xiv, p. 46], the imperfect stage of *Mycosphaerella caricae* [cf. ibid., xi, p. 662], small, whitish, later yellowish, finally red, slightly depressed spots appearing on the lower, and occasionally on the upper, surface of the leaves. The lowest leaves are attacked first, and infect the shoots as they develop; sometimes the fruits are affected, in which case infection may be severe enough to reduce their market value; the perfect stage was found in the epicarp of the fruit in the Zoological Garden in 1933. The disease spreads rapidly during rain- and wind-storms. Affected plants should be sprayed directly the spots appear with 1 per cent. Bordeaux mixture, a further application being made a fortnight later.

Reckendorfer (P.). **Die chemischen Grundlagen der fungiziden Wirkung des Weinbergschwefels.** [The chemical foundations of the fungicidal action of vineyard sulphur.]—*Z. PflKrankh.*, xlv, 11, pp. 537–550, 1935.

The author reviews a number of different theories that have been advanced to explain the fungicidal action of sulphur on true mildew of the vine [*Uncinula necator*] and the powdery mildews [Erysiphaceae] of other plants, all the theories hitherto propounded being based on the presumed chemico-physiological nature of the fungicidal activity of sulphur.

In 1932 Feigl and Fränkel (*Ber.* [*? dtsch. chem. Ges.*], lxv, p. 545) published an account of a method for the detection of sulphur-containing acids and their salts by the induced oxidation of nickel dihydroxide. This process may be studied with the aid of a glass receptacle of 1 c.c. capacity fitted with a glass stopper on which is placed a small amount of freshly precipitated nickel dihydroxide. Within the receptacle is introduced the substance to be tested, and sulphur dioxide is liberated by acidification and slight warming, whereupon black nickel dioxyhydrate is formed. With small quantities of sulphur dioxide the change in colour of the green nickel dihydroxide is difficult to follow, but if benzidine acetate is added the benzidine blue formed by contact with the oxides permits the detection of extremely minute amounts of nickel trihydroxide and of sulphites or sulphur dioxide (*Chem. Ztg*, xliv, p. 689, 1920). Applying this method, the author carried out a series of experiments the results of which are set forth in detail and whence the following conclusions are drawn.

As a consequence of its rapid reactive capacity in the form of vapour, elemental sulphur is constantly liable to oxidation in the presence of atmospheric oxygen and thus capable of producing small quantities of sulphur dioxide which may be detected by the application of the prescribed microchemical colour tests. Discussing the marked superiority of 'ventilato' sulphur [*R.A.M.*, viii, p. 701; xi, p. 682; xiii, p. 322]

over sublimed (flowers of sulphur) for plant-protective purposes, the writer ascertained by further tests that both types show an equal capacity for sulphur-dioxide production in sunlight, hence the greater efficacy of the former is attributable to the fineness of its particles enabling it to spread over the leaves in a film.

It is considered to be clear from these investigations that the observed fungicidal action of sulphur is primarily a function of the sulphur dioxide released under the influence of the sun's rays. However, whether sulphurous acid represents the final stage of fungicidal efficacy or whether the process of oxidation continues until sulphur trioxide is produced remains an open question.

A Resolution of the Fourth International Technical and Chemical Congress of Agricultural Industries.—*Int. Bull. Pl. Prot.*, ix, 11, p. 267, 1935.

The following resolution was adopted by the Fourth International Technical and Chemical Congress of Agricultural Industries [held in Brussels from 15th to 28th July, 1935]: 'That an international organization should be established for the study of the standardization of fungicides and insecticides utilized for the protection of industrial plants.'

Morstatt (H.). **Bibliographie der Pflanzenschutzliteratur: das Jahr 1934.** [Bibliography of plant protection literature for the year 1934.]—*Arb. biol. Reichsanst. Land- u. Forstw., Berl.-Dahl.*, 302 pp., 1935.

This bibliography of German and foreign literature published during 1934 on various aspects of plant protection is compiled on the usual lines [*R.A.M.*, xiv, p. 324].

Leach (J. G.). **Insects in relation to plant diseases.**—*Bot. Rev.*, i, 11, pp. 448–466, 1935.

The writer discusses and illustrates by a number of concrete examples from contemporary literature (the appended bibliography of which comprises 79 titles) various aspects of the connexion between insects and plant diseases under the following headings: the varied relationships of insects and plant diseases; insects and virus diseases; insects and non-parasitic diseases; the biologic and evolutionary significance of the association of insects and plant pathogens; symbiosis between insects and micro-organisms and its significance in plant pathology; the possible role of insects in the origin of new diseases and the extension of old ones; and the future development of research in the field of insects in relation to plant diseases.

Schwartz (W.). **Aufgaben der Chemie im neuen Deutschland. XII. Die Biologie in der Lebensmittelkonservierung.** [Functions of chemistry in the new Germany. XII. Biology in food preservation.] —*Angew. Chem.*, xlviii, 40, pp. 629–632, 1 fig., 2 graphs, 1935.

A general survey is given of modern chemical possibilities in relation to the control of food spoilage by micro-organisms, the losses from

which in Germany are estimated to reach M. 1,200,000,000 to 1,500,000,000 out of a total annual consumption of meat, fish, fruit, vegetables, eggs, milk, and other dairy products of M. 14,300,000,000. Some of the writer's recent work on the protection of meat from fungal infection by storage under appropriate temperature and humidity conditions has been noticed from another source [*R.A.M.*, xiv, p. 633]. In Seiler's (unpublished) experiments the incidence of decay in Berlepsch Golden Pippin apples stored (*a*) in ordinary cellars, (*b*) at a low temperature (3° C.), and (*c*) at 3° C. in an atmosphere consisting of 15 per cent. carbon dioxide and 10 per cent. ozone was 93, 66, and 33 to 37 per cent., respectively.

Scheffer (T. C.). **A tube for culturing fungi.**—*Science*, N.S., lxxxii, 2133, pp. 467–468, 1 diag., 1935.

Satisfactory results have been obtained in studies on the temperature and oxygen relations of growth and respiration in wood-destroying fungi by the use of a modified test-tube with a rounded indentation of the wall on one side near the mouth. This permits the tube to be kept horizontal after charging while the agar solidifies in a uniform narrow strip. By means of inlet and outlet tubes introduced through a rubber stopper gas mixtures may be passed over the culture as desired.

Stakman (E. C.), Levine (M. N.), Christensen (J. J.), & Isenbeck (K.). **Die Bestimmung physiologischer Rassen pflanzenpathogener Pilze.** [The determination of physiologic forms of fungi pathogenic to plants.]—*Nova Acta Leop. Carol.*, N.F., xii, 13, pp. 281–336, 5 pl., 1935.

A comprehensive summary, accompanied by 36 tables, is given of the methods in current use for the determination of physiologic forms in the Uredinales, Ustilaginaceae, Erysiphaceae, and a number of miscellaneous fungi parasitic on plants. Most of the literature cited in the bibliographies appended to each section has been noticed from time to time in this *Review*.

Birkeland (J. M.). **Further serological studies of plant viruses.**—*Ann. appl. Biol.*, xxii, 4, pp. 719–727, 1935.

In continuation of his serological studies of plant viruses [*R.A.M.*, xiii, p. 545], the author gives a brief, tabulated account of precipitin tests with tomato aucuba mosaic virus (Johnson's tobacco virus 6), cucumber mosaic virus 1, tobacco mosaic virus 1, and tobacco ring spot virus, all of which were propagated in serologically unrelated host plants. The results of the work gave additional evidence that the virus itself acts as an antigen [ibid., xv, p. 118], and reciprocal precipitin experiments indicated that the viruses of cucumber mosaic, tobacco ring spot, and tobacco mosaic are serologically distinct; tobacco mosaic, however, was serologically indistinguishable from both the green and yellow strains of aucuba mosaic virus, and probably also from that of tomato streak [ibid., xv, p. 122]. Attempts to obtain a soluble specific substance from the juice of virus-diseased plants or from healthy tomato gave negative results.

Du Toit (P. J.). **Viruses.**—*S. Afr. J. Sci.*, xxxii, pp. 696–705, 1935.

This is an address on recent achievements in the expioration of problems surrounding the filterable viruses, discussed under the headings of invisibility, filterability, and difficulty of cultivation on media universally employed for bacterial propagation [*R.A.M.*, xv, p. 168]. With regard to cultivability, however, the organism causing lung sickness of cattle, which for many reasons is correctly classified as a virus, is an exception to the general behaviour of viruses in that it is cultivated with comparative ease in a particular type of broth. Touching on the bacteriophage, the author states his 'belief that the easiest and most satisfactory manner of explaining this phenomenon is to regard bacteriophage as a virus which attacks the lowest-known form of plant life, the bacteria'.

Cappelletti (C.). **Osservazioni sulla germinazione asimbiotica e simbiotica di alcune Orchidee.** [Observations on the asymbiotic and symbiotic germination of some Orchidaceae.]—*Nuovo G. bot. ital.*, N.S., xlii, 2, pp. 436–457, 1 pl., 1935.

When seeds of different hybrids of the Orchidaceae belonging to the genera *Cattleya* and *Cymbidium* were grown on media containing symbiotic fungi of the Orchidaceae (chiefly *Mycelium radicis* and *Hypochnus catonii*) or in which such fungi had been destroyed by heating, similar seed being grown on ordinary media for purposes of comparison, the results obtained showed that while in general the best germination was obtained on living cultures of the symbionts, in many cases the metabolic products of the fungi alone had a beneficial effect on germination and the subsequent appearance of chlorophyll in the protocorms [*R.A.M.*, xv, p. 108]. On ordinary agar the protocorms sometimes did not turn green for over a year. The effect of late symbiosis on protocorms developed asymbiotically was generally very marked; for instance, protocorms of *Cymbidium gottianum*×*C. florinda* over one year old turned green in seven days on living cultures of the symbiont, and in two months on killed mycelium of the symbiotic fungi of *Phalaenopsis* and *Serapias*. For commercial purposes culture on the living mycelium of these fungi is still recommended.

Magrou (J.). **Essais de cultures des champignons de mycorhizes.** [Culture experiments with mycorrhizal fungi.]—*C. R. Acad. Sci., Paris*, cci, 22, pp. 1038–1039, 1935.

A number of longitudinal sections of *Arum maculatum* roots infected by an endophyte produced non-septate hyphae of the mycorrhizal type in Van Tieghem cells and drops of soil decoction (Molliard's technique) [*R.A.M.*, xiv, p. 247] with or without 1 per cent. starch. As in the natural state, the hyphae fell into three groups, (1) relatively slender (3 μ in diameter), producing sparse, very long, secondary branches; (2) thicker (5 to 10 μ in diameter), irregular, forming numerous ramifications; and (3) voluminous, of nodular aspect, not branched. As a rule the hyphae developing in artificial culture did not exceed 3 mm. in length, but on transference to a mixture of soil decoction and agar one reached 5·6 mm. None produced fructifications,

and it may be assumed that the endophyte, lacking elements indispensable to growth and exposed to external contamination, cannot long subsist independently of the host roots.

VERONA (O.). **Manière de se comporter des micro-organismes vis-à-vis de certaines substances colorantes. Étude particulière sur le vert malachite et sur son application éventuelle en phytothérapie.** [The mode of behaviour of micro-organisms towards certain colouring agents. A study on malachite green in particular, and its eventual application in phytotherapy.]—*Boll. Sez. ital. Soc. int. Microbiol.*, vii, 11, pp. 426–428, 1935.

A study of the effect on over 50 species of bacteria, yeasts, and fungi [which are listed] of adding different colouring agents to the culture medium showed that the most marked growth-inhibiting action was given by malachite green [*R.A.M.*, xiv, p. 765]; the next most effective agent was brilliant green, while gentian violet exercised a slight effect [ibid., xiv, p. 758]. The bacteria were in general more resistant than the fungi. At a concentration of 1 in 100,000 malachite green arrested the germination of spores of *Tilletia levis* [*T. foetens*], *T. caries*, *Ustilago maydis* [*U. zeae*], and *U. tritici*. Solutions of the same agent prevented zoospore formation by *Plasmopara viticola*, but at a strength of 1 in 10,000 this substance had no effect as a spray against the fungus on the vine [ibid., xii, p. 74; xiii, p. 351]. Wheat seed immersed for six hours in malachite green solution at 1 in 10,000 gave a larger yield than untreated seed and seed treated with copper sulphate and lime. The addition to malachite green solution of milk, jelly, dextrin, and molasses did not reduce its fungicidal power, which was increased in the presence of amyl alcohol; the leucobase that formed when suitable amounts of potassium alkali were added to the malachite green was more strongly fungicidal than the original colouring agent.

SAKSENA (R. K.). **Recherches physiologiques et cytologiques sur quelques espèces du genre Pythium.** [Physiological and cytological researches on some species of the genus *Pythium*.]—120 pp., 7 pl., 2 figs., 5 graphs, Paris, Librairie Générale de l'Enseignement, 1935.

A full account is given of a detailed investigation by the author of the physiology and cytology on different media and under various conditions of growth of *Pythium deliense* [*R.A.M.*, xiii, p. 599; xiv, p. 473], *P. de Baryanum*, *P. mamillatum* [ibid., xii, p. 307], and *P. indigoferae*; all the fungi were obtained from Baarn, the first named having been isolated by Meurs from tobacco in Sumatra.

On maize meal agar at 20° C. *P. indigoferae* made the poorest growth, *P. de Baryanum* the best, the other two species being intermediate. At 20° *P. de Baryanum* grew the most rapidly, followed in decreasing order by *P. deliense*, *P. mamillatum*, and *P. indigoferae*. At 30° *P. deliense* made better growth than *P. de Baryanum*, all the species except *P. deliense* showing their maximum growth-rate at this temperature. The minimum, maximum, and optimum growth temperatures for *P. deliense* were, respectively, 10°, about 40° to 45°, and 35°; at temperatures below 10° growth was suspended, but was renewed when the

fungus was transferred to favourable conditions. The organism was killed at 45° after 24 hours.

It was ascertained that ammonia but not nitrates serve as a source of nitrogen for *P. deliense*. The sulphates can be used as sources of sulphur. In the absence of nitrogen *P. deliense* made no growth, and in the absence of sulphur reduced growth. Peptone was a complete nutrient for all four species. The addition of 10 per cent. glucose or maltose or of a large amount of neutral red retarded the growth of *P. deliense*; cod-liver oil favoured growth, small amounts of malt extract retarded it, and 0·5 per cent. tannic acid inhibited it.

On maize meal agar adjusted to different P_H values the growth curve of *P. deliense* showed two maxima, one at P_H 5 and the other at P_H 9, with a minimum between these points at P_H 7; on the acid side growth ceased at P_H 2·9 and on the alkaline at P_H 10·6.

At 30° C. on maize meal agar *P. deliense*, *P. mamillatum*, *P. de Baryanum*, and *P. indigoferae* developed sexual organs in 12 to 18, 48, 72, and 96 hours, respectively. At both low and high temperatures their formation was retarded; they developed in light and dark conditions but not in the absence of oxygen. *P. deliense* formed sexual organs on most media, but peptone, which favoured the vegetative growth of all four species, inhibited their formation. Sexual reproduction was retarded also by malt extract or the absence of ammonia, but was accelerated by cod-liver oil.

All four species hydrolysed peptone solutions with the production of ammonia, an initial P_H value of 5 being changed at 30° C. by *P. deliense*, *P. de Baryanum*, and *P. mamillatum* to 8·3, 7·92, and 7·88, respectively, in 21 days, the corresponding value for *P. indigoferae* being much less altered at 6·01. None of them formed oxalic acid or hydrolysed saccharose, but they all hydrolysed soluble starch, secreting diastases but not invertases.

Though *P. deliense* did not as a rule form sporangia in culture, the formation of these organs at 30° C. was obtained by transferring portions of oat agar cultures to Petri's solution; zoospores were produced on transference to tap-water.

Cytological studies on the species are described in detail.

CARTER (J. C.). **Diffusible nature of the inhibitory agent produced by fungi.**—*Phytopathology*, xxv, 11, pp. 1031–1034, 1935.

Potato dextrose agar, staled by the combined growth of *Helminthosporium sativum* and a bacterium herein referred to as 9a2, was found to inhibit the further growth of the fungus [*R.A.M.*, xiv, pp. 387, 464]. The fact that the preventive action was exercised by portions of sterile agar taken from between the two organisms and placed a few mm. from the growing fungus is considered to establish the diffusible nature of the inhibitory agent, which was confirmed by obtaining the diffusion of the agent into water. The substance in question is thermostable and retains its growth-inhibiting properties after sterilization in an autoclave. The bacterium was shown to be the more potent of the two partners in the formation of the anti-fungal product, which also proved antagonistic to *H.* [*Curvularia*] *inaequalis*.

Folsom (D.). **Potato virous diseases in 1934.**—*Amer. Potato J.*, xii, 11, pp. 304–310, 1935.

A bibliography, compiled on the lines of previous surveys and comprising 119 titles, is given of contemporary American, European, and Colonial literature on potato virus diseases [*R.A.M.*, xiv, p. 54].

Ziekten en beschadigingen van het Aardappelloof. [Diseases and pests of Potato foliage.]—*Versl. PlZiekt. Dienst Wageningen* 6 (7th Ed.), 32 pp., 9 pl. (1 col.), 1935.

In this revised edition of an earlier pamphlet of the same series [*R.A.M.*, vii, p. 459] semi-popular notes are given on the following diseases affecting potato foliage in Holland: leaf roll, mosaic (including crinkle and aucuba), streak, *Rhizoctonia* (*Hypochnus* [*Corticium*]) *solani*, *Verticillium albo-atrum*, *Alternaria solani* [ibid., xiii, p. 54], *Phytophthora infestans* [ibid., xiv, p. 715], *Cercospora concors* (observed for the first time in 1935 producing on the upper leaf surfaces brownish-yellow, purple-bordered spots) [ibid., xiv, p. 741], wart disease (*Synchytrium endobioticum*), *Sclerotinia libertiana* [*S. sclerotiorum*], and blackleg (*Bacillus atrosepticus*) [*B. phytophthorus*].

Körler (E.). **Erfahrungen beim feldmässigen Abbau von künstlich blattrollinfizierten Kartoffeln (Sorte Kl.-Sp. Wohltmann). (Untersuchungen über die Viruskrankheiten der Kartoffel. V. Mitteilung.)** [Experimental observations on the degeneration under field conditions of Potatoes (Kl.-Sp. Wohltmann variety) artificially infected by leaf roll. (Investigations on the virus diseases of the Potato. Note V.)]—*Arb. biol. Reichsanst. Land- u. Forstw., Berl.-Dahl.*, xxi, 4, pp. 517–529, 2 pl., 1935.

Continuing his studies on the virus diseases of potatoes [*R.A.M.*, xiv, p. 388; xv, p. 43], the writer gives a fully tabulated account of his experimental observations on the incidence of 'degeneration' in two localities, Mechow (Brandenburg) and Marienfelde (Berlin), both of which enjoy a high reputation for health as understood in connexion with the ecological degeneration theory [ibid., xiv, p. 785].

In 1934 virus diseases developed spontaneously in both places, Marienfelde suffering particularly severely from the virulent Y-streak [ibid., xiv, p. 649] and also showing a higher total of all infections than Mechow, where the relatively innocuous 'rolling mosaic' referred to below predominated. Leaf roll was experimentally transmitted among the progeny by means of aphids (*Myzus persicae*) in both places, the infected plants being heavily damaged and showing marked evidence of 'degeneration'. The (ecologically) healthier conditions prevailing at Mechow failed to reduce the amount of leaf roll, a fact considered to lend further weight to the theory that this disease is a primary factor in 'degeneration'. On the other hand, the tardy germination of the tubers grown at Marienfelde as compared with that of the Mechow produce may be regarded as a purely physiological after-effect of the habitat.

For the first time in Germany a mosaic virus was detected on the potatoes used in these trials which was not transmissible to tobacco by

means of expressed juice. It appears to be related to the American leaf-rolling mosaic [ibid., xi, p. 667] and the English paracrinkle [ibid., xiii, pp. 48, 321]; further studies on its nature have been initiated. Conspicuous features of the disorder are the upright growth, softness, mottling, and upward rolling of the leaves, the under sides of which show extensive anthocyanin formation.

Ring mosaic [ibid., xiv, p. 388] occurred in various forms and degrees of virulence in both localities.

KLAPP (E.). **Zusammenhänge von Standortseigenschaften, Viruserkrankung und Nachbauertrag der Kartoffel.** [Connexions between ecological properties, virus disease, and progeny yield of the Potato.]—*Pflanzenbau*, xii, 5, pp. 163–191, 6 figs., 1935.

Ecological influences have been shown by the writer's extensive studies in Germany to induce modifications of various kinds in the constitution of the potato, but in the absence of virus diseases [see preceding abstract] such changes are as a rule reversible. True degeneration, on the other hand, is irreversible and here the effects of the associated viruses play a decisive part. In the present series of experiments the lowest yields in the first generation from seed were consistently derived from crops with severe virus infection. Referring to the problem of the relative importance in the etiology of degeneration of ecological conditions and virus infections, the writer considers that the dissemination and activity of the latter are entirely dependent on the former. In this sense, therefore, the viruses cannot be regarded as the primary cause of degeneration, though they certainly are intimately concerned in the progress and intensification of the adverse changes already initiated by conditions inherent in the place of growth. In this connexion it is pointed out that, at any rate in the case of mildly infected material, the avoidance of injurious ecological influences greatly alleviates the symptoms and in fact may render them negligible from a practical standpoint. To sum up, the writer thinks that the exclusion of deleterious ecological and nutritional influences is at least as important in the production of healthy seed as the suppression of viruses by stringent selection on the part of breeders and growers.

PULLEN (A. R.) & WASSERMANN (J.). **Some observations on Potato 'degeneration' in South Africa.**—*S. Afr. J. Sci.*, xxxii, pp. 271–279, 1 pl., 1935.

Potato deterioration is stated to be common in South Africa, necessitating the constant importation of fresh stocks from overseas, especially of Up-to-Date from Scotland. An examination of the Transvaal potato fields suggests that virus diseases are far less common than might be expected. Typical leaf roll has not been detected but an apical leaf roll occurs fairly generally. It causes a rolling of the basal portion of the smaller leaflets on young leaves, the terminal growth is checked, and the lower shoots are stimulated, giving the plant a pyramidal shape. The leaves develop a reddish or purplish colour and the tubers are reduced in size. Other diseases present are giant hill [*R.A.M.*, xiii, p. 722], spindling sprout [ibid., x, p. 201; xiv, p. 715], spindle tuber [ibid., xiv, p. 784], and yellows (? mosaic) characterized by a generalized

chlorosis and stunted, unthrifty plants. Spindle tuber occurs in two forms, i.e., the typical one and the so-called 'violet' spindle (a local name, descriptive of the general appearance of the growing plant), in which the leaflets, especially the terminal, are broadened and the whole plant is somewhat stunted and compact, though erect. There are many slender stems with swollen nodes. The tubers are elongated, but not pointed at one end as in true spindle tuber, and abnormally few and small, and the eyes are crowded at the bud end. This disorder appears to be confined to generations following the first from imported seed.

Attention is drawn to the local prevalence of the so-called 'wild' potatoes, a description of two forms of which, viz., the true pink-eyed and No. 2 (white-eyed), is given. These bear a large number of seed-size tubers but are considered to be genuine rogues and not systemic virus-diseased plants. Careful seed selection, followed by hill selection of normal plants, and rogueing are essential to the control of degeneration.

Tschernyschova (Mme O. P.). **Schädlichkeit von Viruskrankheiten der Kartoffel.** [Damage from Potato virus diseases.]—*Arb. ForschInst. Kartoff., Moskau, 1935*, pp. 59–84, 1935. [Russian. Abs. in *Bot. Zbl.*, xxvii, 5–6, pp. 170–171, 1935.]

Mild mosaic is stated to be generally of a very innocuous character in U.S.S.R., but in the Centifolia and Great Scot varieties losses of 29 and 20·65 per cent. at harvesting were attributed to this source. Crinkle, on the other hand, is widespread and very severe [*R.A.M.*, vii, p. 263], except on late varieties. The adverse effects of mosaic are expressed in a reduction in the number of tubers and (in early and medium-early varieties) in their size, the starch content being scarcely influenced. In the case of medium-late and late varieties virus diseases may occasionally cause an increase in the weight of the tubers.

Marchionatto (J. B.) & Millán (R.). **Certificación de la 'semilla' de Papa.** [Potato 'seed' certification.]—*Bol. Minist. Agric., B. Aires*, xxxvi, 4, pp. 301–312, 9 col. pl., 1934. [Received February, 1936.]

Following a brief explanatory account of the introduction of quarantine legislation for the exclusion of potato diseases (with special reference to those of virus origin) in Brazil [*R.A.M.*, viii, p. 815; xv, p. 64], Uruguay [ibid., xiii, p. 672], and the Argentine (where these disorders are stated to be assuming great importance), the writers append copies of the relevant decrees issued by the three Republics.

The following are among the provisions of the Argentine Order, issued 24th February and amplified 6th November, 1934, governing the production of certified seed potatoes in that country. Tubers used as seed should be certified stock selected from varieties of known resistance to virus diseases and as a precautionary measure they should be disinfected for one hour in mercuric chloride 1 in 1,000. In districts where *Phytophthora infestans* is permanently established the crops should be periodically sprayed with 1 per cent. Bordeaux mixture, while at the same time aphids should be combated with nicotine and other insects with arsenical preparations to prevent the development of viruses.

Three inspections are made of all plantings registered for certification, (1) at flowering, (2) before maturity, and (3) during harvest. At (1) the

limits of tolerance in respect of the various diseases are up to 5 per cent. for mosaic and yellow dwarf [ibid., xv, p. 42], and up to 10 per cent. for other parasitic maladies (excluding *P. infestans*); infected plants in stands falling within these limits of tolerance must be eradicated and burnt under official supervision. At (2) the maximum for all parasitic diseases and 'viruses' is fixed at 5 per cent., and the detection of severe attacks of a virus disorder in plantings contiguous or in close proximity to those submitted for certification disqualifies the latter for seed purposes without further inspection. At (3) the rigorous selection of healthy tubers is enforced, the maximum tolerance for scab (*Actinomyces scabies*) and black scurf (*Corticium vagum*) [*C. solani*] being 5 per cent., while certification is refused in the case of any trace of bacterial wet rot. Health certificates are supplied for consignments of seed potatoes for foreign countries.

STEWART (F. C.). **A Potato seed plat roguing experiment.**—*Bull. N.Y. St. agric. Exp. Sta.* 655, 10 pp., 1935.

Through the use of an isolated and carefully rogued seed plot a grower in northern New York has succeeded during nine consecutive years (1924 to 1932) in producing a high grade of certified Green Mountain potatoes from fields of six to eight acres, the total incidence of virus diseases (mosaic and leaf roll) detected at two inspections in the latter year being 0·4 per cent. compared with 2·6 per cent. in the former [cf. preceding abstract]. The favourable outcome of this experiment is attributed mainly to (1) the suitable position of the plot in a region where high temperatures are rare and aphids seldom plentiful on potatoes; (2) earliness and thoroughness of the roguing operations; and (3) use of the tuber-unit method of planting [*R.A.M.*, xiv, p. 714].

PASINETTI (L.). **Ricerche istologiche sulla 'maculatura ferruginosa' (Eisenfleckigkeit) dei tuberi di Patata.** [Histological researches on rust spot (Eisenfleckigkeit) of Potato tubers.—*Riv. Pat. veg.*, xxv, 5–6, pp. 185–227, 21 figs., 1935.

Cytological and histological studies [which are described in detail] showed that 'Eisenfleckigkeit' disease of potato tubers [*R.A.M.*, xv, p. 111, and next abstracts] falls into nine distinct stages. The first stage is marked by slight darkening of the wall of one cell in the healthy parenchyma, beginning at a corner and spreading for a short distance along the cell wall. The entire content of the cell appears to be completely normal. In the second stage rod-shaped granulations are seen in the protoplasm, which collects against the cell walls, leaving up to six or seven vacuoles in the middle; the discoloration of the wall may affect two or three corners of the cell. The third stage is characterized by the star-shaped appearance assumed by the affected cells, as a result of marked discoloration at various points; the cell wall swells at these places and the protoplasm aggregates towards them. In the fourth stage the discoloration spreads over the whole of the cell wall and the protoplasm in the affected cell or cells coagulates and solidifies. This is followed, in the fifth stage, by abnormal division in the cells of the healthy tissues surrounding the group of diseased cells. The sixth stage is characterized by the formation of more groups of affected cells,

separated from other similar groups and incorporated in the mass of dividing cells. In the seventh stage the central affected groups become scattered by the growth of the tissues. The eighth stage is marked by the complete alteration of the cell wall and the cytoplasm and the extension of the disease to a large area of the parenchyma. Finally, a periderm is formed cutting off the diseased from the healthy part, followed by the suberization of the walls of a large part of the cells composing the affected area.

The author's observations failed to establish the presence in affected tissues of any parasitic organism and he concludes that 'Eisenfleckigkeit' is a physiological condition due to unfavourable environmental factors.

SCHLUMBERGER (O.). **Die Krankheitswiderstandsfähigkeit der Kartoffel.** [The resistance to disease of the Potato.]—*Mitt. Landw., Berl.*, l, 47, pp. 1013–1014, 1935.

Absolute resistance to disease in potatoes appears to be confined to wart disease [*Synchytrium endobioticum*: cf. *R.A.M.*, xiv, p. 55], the capacity to withstand infection in all other cases being conditional. Thus, varieties resistant to scab [*Actinomyces scabies*], 'Eisenfleckigkeit' [see preceding and next abstracts], *Rhizoctonia* [*Corticium solani*], *Bacillus phytophthorus*, and late blight [*Phytophthora infestans*] under appropriate environmental conditions may succumb to these disorders in an adverse environment. The breeding of varieties resistant to *P. infestans* has been further complicated by the detection of various physiologic forms of the fungus [ibid., xiv, p. 390].

EHRKE (G.). **Untersuchungen uber die Stoffwechselvorgänge in eisenfleckigen Kartoffeln.** [Investigations on the metabolic processes in 'eisenfleckig' Potatoes.]—*Anyew. Bot.*, xvii, 6, pp. 453–483, 6 figs., 1 diag., 11 graphs, 1935.

The outstanding results of the writer's researches on the metabolic aspects of 'Eisenfleckigkeit' in potatoes, which are here presented in a comprehensive, fully tabulated form, have already been noticed from another source [*R.A.M.*, xiv, p. 717, and cf. preceding abstracts].

ROCHLINA (E[MILIA] J.). **On some peculiarities of late blight resistant Potato varieties.**—*Arb. ForschInst. Kartoff., Moskau, 1935*, pp. 85-96. 1935. [Russian, with English summary. Abs. in *Bot. Zbl.*, xxvii, 5–6, p. 171, 1935].

The chemical constituents of the host, especially solanin, have been found to influence the varietal reaction of potatoes to late blight (*Phytophthora*) [*infestans*] in U.S.S.R. [*R.A.M.*, xiii, pp. 52, 468], the amount of this substance in old tubers of resistant varieties being larger than that in similar material of susceptible sorts.

DE BRUIJN (HELENA L. G.). **Het schurftvraagstuk van mycologische zijde beteken.** [The scab problem considered under the mycological aspect.]—Reprinted from *Landbouwk. Tijdschr., Wageningen*, xlvii, 579, 8 pp., 5 figs., 1935. [English summary.]

The outcome of the writer's inoculation experiments confirmed those of Millard and Burr [*R.A.M.*, vi, p. 179] and Wollenweber (*Arb.*

ForschInst. Kartoff., Berl., ii, 1920) in respect of the capacity for different isolations of *Actinomyces* [*scabies*] from diseased potatoes to cause divergent types of scab on the Bintje variety. One strain capable of causing severe symptoms was grown by a collaborator in a synthetic solution mixed with the sap of tubers of different varieties (Bintje, Erdgold, Eigenheimer, and Alpha) according to Kiessling's method [*R.A.M.*, xiii, p. 259]. The hydrogen-ion concentration of the solution tended to become more alkaline with the age of the tubers in the case of Eigenheimer and Alpha, and the growth of the fungus was correspondingly more luxuriant in the 20th July and 20th September series than in that of 20th June. The Bintje sap was the most alkaline (P_H 6·3) from the outset and underwent little change (to P_H 6·5) while the results obtained with Erdgold were variable, like those commonly given by this variety in practice [ibid., xiii, p. 50]. The best growth took place on the sap of the susceptible Bintje variety, while hardly any occurred on that of young tubers of the resistant Alpha, confirming the importance of physiological factors in scab resistance.

Fitch (C. L.). **The geography of scab in the United States.**—*Amer. Potato J.*, xii, 11, pp. 310–316, 1935.

The following factors would appear, from a survey of the United States potato-growing areas from the standpoint of scab [*Actinomyces scabies*] prevalence [*R.A.M.*, xv, p. 172], to be primarily concerned in the presence or absence of the disease; the extent of soil or seed infestation; the possibility and degree of tuber infection as influenced by (*a*) the variety and (*b*) early season weather conditions; the degree of aeration in relation to (*a*) water in the soil tending to displace air or hinder its entrance, (*b*) soil texture, and (*c*) type of subsoil; soil reaction as determined by (*a*) lime and other alkalis present, and (*b*) acid production with ammonium sulphate and sulphur; and soil temperature as the outcome of (*a*) air temperature and sunshine, and (*b*) moisture in soil and subsoil and the ground water level.

Rojalin (L. B.). **The effect of plant nutrition on the resistance of different Potato varieties to the bacterial ring disease.**—*Arb. ForschInst. Kartoff., Moskau, 1935*, pp. 1–21, 1935. [Russian, with English summary. Abs. in *Bot. Zbl.*, xxvii, 5–6, p. 170, 1935.]

The vital activity of the bacteria responsible for ring rot of potatoes [*Bacterium sepedonicum*: *R.A.M.* xi, p. 670] involves a loss of glucose in the region of the vascular bundles. The development of the disease in the field coincides with a maximum accumulation of glucose in the stems, and varieties resistant to ring rot are characterized by the slowness with which they store up glucose in the tubers. The presence in the soil of relatively large quantities of nitrogen and phosphorus induces an unduly rapid accumulation of glucose in the stems and tubers with a consequent decline in resistance to ring rot. In sandy soils the storage of glucose by the plants may be retarded and resistance to ring rot correspondingly increased by manuring with potash. Potatoes cultivated in black, fertile soils show a natural resistance to the disease associated with slow glucose accumulation in comparison with plants grown on poor sand or peat. Under the latter conditions intensive

applications of potash for two to three years, combined with the removal of infected plants, are essential for the control of ring rot.

Săvulescu (T.). **Rumania : non-existence of wart disease of Potatoes in the country.**—*Int. Bull. Pl. Prot.*, ix, 11, p. 250, 1935.

Rumania is stated to be free from infestation by potato wart disease (*Synchytrium endobioticum*), so that tubers grown in the country may safely be purchased for use elsewhere, more especially since all consignments destined for export are subject to official inspection and accompanied by duly authenticated health certificates.

Chamberlain (E. E.). **Corticium-disease of Potatoes. The effect of crop rotation on its persistence in the soil.**—*N.Z. J. Agric.*, li, 5, pp. 287–289, 1 fig., 1935.

The final result in 1934 of the experiments started in 1928 [at Palmerston North: *R.A.M.*, xi, p. 201; cf. also pp. 260, 534] to determine the effect of crop rotation on the persistence in the soil of the *Corticium vagum* [*C. solani*] disease of the potato in New Zealand, showed that rotation of two or three years with cereals, *Brassica* spp., and legumes tended to reduce the amount of infection with the fungus in the soil. The *Brassica* spp. and legumes were slightly more effective in this respect than the cereals, but grass gave a greater and more consistent reduction in soil infection (73, 56, and 3 per cent. infection after 1, 2, and 3 years' rotation, respectively). In the final plot which remained under grass for 4 years the disease was practically eliminated in the soil, since out of 160 potato plants raised on it from tubers treated by the acidulated mercuric chloride method [loc. cit.] only one became infected with *C. solani*.

Leach (J. G.) & Darling (H.). **Symptoms of Potato wilt in Minnesota this year.**—*Plant Dis. Reptr*, xix, 19, pp. 299–302, 1935. [Mimeographed.]

After making satisfactory initjal growth, potato plants in west-central Minnesota showed very unusual symptoms during the second week in July, consisting of an upward rolling and reddening of the leaves, abnormal development of the aerial shoots, and a profusion of aerial tubers in the leaf axils, especially near the base. The incidence of the trouble increased rapidly until in many fields up to 50 per cent. infection was counted. A new virus disease was at first suspected, but microscopic examination revealed the constant presence in the vascular bundles of a species of *Fusarium*, probably *F. oxysporum*, though the general appearance of the affected plants was suggestive of attack by *F. eumartii* [*F. solani* var. *eumartii*: *R.A.M.*, xiii, p. 651]. There was an extensive accumulation of starch in all the aerial parts.

Fusarium wilts are stated to have been generally increasing in prevalence in the State during the last 4 years, and in 1934 the estimated incidence of the wilt in potato was 4 per cent., the highest recorded for 15 years. From a consideration of the meteorological data prevailing during the summer of 1935 it would appear that soil temperatures were sufficiently high to promote abundant infection, the typical lethal effects of which were mitigated, however, by heavy rainfall and high humidity.

The production of red pigment, the development of axillary shoots, and the formation of aerial tubers are held to be sufficiently explained by the excessive accumulation in the vascular system of starch which could not be conveyed to the tubers owing to obstruction by the fungus involved.

VAN SCHREVEN (D. A.). **Physiologische proeven met de Aardappelplant.** [Physiological experiments on the Potato plant.]—Reprinted from *Landbouwk. Tijdschr., Wageningen*, xlvii, 579, 23 pp., 8 figs., 1935. [English summary.]

A full account is given of the writer's experiments to determine the effects on potato plants in water and sand cultures of a deficiency (and in a few cases also of an excess) of some important nutrient elements.

The symptoms of nitrogen shortage were a uniform pale to yellowish-green coloration of the plants, restricted development, abnormal elongation of the roots, and small tubers. Phosphorus deficiency is expressed by an upward tendency of the petioles, leaflets (which are unusually small and dark), and leaf margins, stiffness of the plants, and poor root and tuber growth. Potash shortage, on the other hand, leads to a drooping of the leaflets and leaf margins, a dark green, subsequently bronze or yellow tinge being imparted to the foliage, the interveinal tissue of which is much raised; there is a decrease in the ratio of length to breadth, shortening of the stolons, poor root and tuber development, and in severe cases, necrosis of the leaf margins and stem and petiole discoloration [*R.A.M.*, xv, p. 46].

The effect of magnesium deficiency [ibid., xiv, p. 649] on President plants was very severe. Chlorosis originated at the tips of the basal leaves, gradually spread over the surface, and progressed upwards to the top of the plant, the youngest leaves of which, however, remained green. The older leaves died prematurely. In severe cases the chlorotic tissue was almost pure white, but usually it is pale yellow and abnormally raised, while the leaf tips and margins droop. The symptoms were aggravated by an excessive supply of nitrogen.

The first indication of calcium deficiency is a pale green band along the margins of the young leaves of the bud, which prevents the normal development of the latter and often produces a wrinkled appearance. In severe cases the young leaves at the top of the plant remain folded and the whole top dies. The medullary region of the tubers shows a necrotic spotting closely agreeing with that described by Miss Schwarz from the Dutch East Indies under the name of 'rusty spot', for which it is proposed to substitute the term 'medullary necrosis' as less likely to cause confusion [ibid., xiv, p. 253].

Boron deficiency is characterized by dying-off of the growing points, curling (generally upwards) of the leaf margins and thickening of the surface, and a generally chlorotic appearance. In extreme cases anthocyanin is formed, the internodes are shortened, giving a short, bushy aspect to the plants, and the petioles are very brittle. The leaf tips and margins die prematurely, and at an advanced stage the roots are short, thick, and brown, and the whole system looks stunted owing to the profuse development, after the death of the root tips, of secondary rootlets which frequently cease growth soon after emergence. The

tubers are abnormally small and often split across the surface. The apical cells and procambium at the growing points become discoloured and necrotic, the symptoms subsequently extending to the stem, axillary buds, and interior of the lateral shoots. The stelar structure may be specially severely affected. The cells of the cambium, phloem, and parenchyma are often deformed by extension and compression, and whole groups may disintegrate into a dark brown mass, whereas the xylem is usually poorly developed. In treated glass sand cultures the addition of 3·5 mg. boric acid per l. sufficed to prevent the above-mentioned symptoms, whereas in the case of heart rot of beet it is necessary to apply the same substance at the rate of 40 to 50 mg. [ibid., xv, p. 189].

Manganese deficiency is expressed by a pale green to chlorotic tinting of the interveinal foliar tissue, the tops of the stems, and the shoots, followed by the continuous development of numerous brown spots along the veins. Tuber formation is arrested. An excess of this element in the same variety leads to necrotic spotting of the foliage, accompanied in severe cases by patches and streaks on the veins, petioles, and stems. Iron deficiency causes slight chlorosis of the foliage, the affected tissue becoming in extreme cases almost pure white.

Copper sulphate in excess results in scorching and collapse of the plants, and an excess of sodium chloride (0·5 per cent.) induces chlorosis, followed by necrosis and death, of the margins of the basal leaves.

Costantin (J.) & Magrou (J.). **Sur les mycorhizes de la Pomme de terre.** [On Potato mycorrhiza.]—*Ann. Sci. nat., Bot.*, Sér. X, xvii, 1, pp. 37–50, 2 pl., 1935.

After referring to their previous observations on the production of a typical endophytic mycorrhiza in the roots of two potato plants raised from true seed in virgin soil in the Pyrenees at an altitude of 1,400 m. [*R.A.M.*, vi, p. 434; xiii, p. 536, and next abstracts], the authors state that a repetition of the experiment at altitudes of 560 and 1,400 m. in 1934 with seedlings from four potato varieties gave similar results, mycorrhizal development being entirely absent in ordinary, manured soil and either abundant or absent, depending on the individual plants, in virgin soil. Potato plants grown from tubers in the same plots in ordinary soil showed abundant root infestation by the mycorrhizal fungus [ibid., xiv, p. 602]. Endophytic mycelium of both the inter- and intracellular types was found.

Costantin (J.). **Quelques résultats des cultures de Fontainebleau (1934). Solanum tuberosum.** [Some results with the sowings at Fontainebleau (1934). *Solanum tuberosum.*]—*Ann. Sci. nat., Bot.*, Sér. X, xvii, 1, pp. 59–63, 1935.

Tubers of a seedling of the Maréchal-Franchet-d'Esperey potato variety grown at an altitude of 1,400 m. gave lower yields the following year in the plains than at altitudes of 560 and 1,400 m. [see preceding and next abstracts]. The beneficial influence of altitude was also manifested by partially degenerated tubers of the Bevelander variety, raised at 1,650 m., when grown at Fontainebleau. Both healthy and degenerated tubers of different varieties raised in the Pyrenees at

1,400 m. gave much better yields at Fontainebleau than corresponding tubers raised at 560 m. The yield from nineteen tubers raised at an altitude of 2,860 m. in 1933, and grown at Fontainebleau in 1934, averaged only 305 gm. The original stock was healthy and the unsatisfactory result is attributed to 'climatic degeneration' due to the very high altitude.

COSTANTIN (J.). **La rusticité des plantes alpestres.** [The hardiness of mountain-grown plants.]—*Ann. Sci. nat., Bot.*, Sér. X, xvii, 1, pp. 65–80, 3 figs., 1935.

In discussing the acclimatization of potato plants to mountain conditions, the author suspects that the presence of the mycorrhizal fungus in virgin soil [see preceding abstracts] may account for the better growth of tubers obtained from true seedlings in this soil as compared with ordinary soil, at altitudes of 560 and 1,400 m. in the Pyrenees. Virgin soil also appeared to increase the yield of true seedlings grown at 560 and 1,400 m. without recourse to previous planting at high altitudes; in ordinary soil scarcely any tubers were found at 560 m. but a moderate quantity at 1,400, indicating that ordinary soil may contain mycorrhizal fungi abundantly at 1,400 m. but only very sparsely at 560 m. The sudden adaptation to an altitude of 1,400 m. observed in certain seedlings is attributed to the presence of mycorrhizal fungi.

FAWCETT (G. L.). **Notas sobre nuevas plagas del Arroz en Tucumán.** [Notes on new Rice pests in Tucumán.]—*Circ. Estác. exp. agríc. Tucumán* 45, 3 pp., 1 fig., 1935.

Rice leaves bearing small, black, sometimes confluent spots, mostly on the upper side, were submitted for examination to E. C. Tullis, who identified the agent of the disorder as *Entyloma oryzae* [*R.A.M.*, xiv, p. 498]. The disease, which now appears to be widespread in Tucumán, is probably of recent introduction; it affects chiefly the basal leaves of irrigated (as opposed to dry land) rice.

AOKI (Y.). **On physiologic specialization in the Rice blast fungus, Piricularia oryzae Br. et Cav.**—*Ann. phytopath. Soc. Japan*, v, 2, pp. 107–120, 1935. [Japanese, with English summary.]

On the basis of four important characteristics, namely, formation of aerial hyphae, extent of sporulation, coloration of the submerged mycelium in potato decoction agar with 1 per cent. saccharose, and growth of the submerged mycelium in three synthetic agar media with varying amounts of glucose, the writer divided 23 culture strains of *Piricularia oryzae*, the agent of rice blast in Japan [*R.A.M.*, xiv, p. 653], into 14 distinct types. A comparison was made of the conidial dimensions of 16 culture strains representing 8 types on potato decoction agar with 1 per cent. saccharose, the results of which revealed no outstanding differences between them.

BLAUSER (I. P.). **Soil sterilization by electricity.**—*Agric. Engng, St Joseph, Mich.*, xvi, 11, pp. 436–438, 440, 2 diags., 4 graphs, 1935.

Two different methods of applying electricity to soil sterilization are stated to be employed in Ohio, one involving the use of insulated electric

heating elements in a soil container, the advantages of which appear to be more than offset by its unduly high initial and operating costs and very uneven heating of the soil, and the resistance type [*R.A.M.*, xiv, p. 778], a simple and inexpensive method exposed to the drawbacks of variability of electric demand and the need for extreme care in operation. By the use of two horizontal electrodes placed one on top of the other in the container it has been possible to overcome certain difficulties met with in the installation of vertical electrodes which tended to cause uneven heating. The soil sterilizer for two electrodes, 36 by 24 in., has a standard soil depth of 10 in. In a typical case of a sandy loam soil with a 22·5 per cent. moisture content by weight the initial demand was 2·3 kw., increasing to 10·2 kw. with a rise in temperature to 210° F. The amount of electricity consumed in soil sterilization by the resistance method averages about 1 kw. hour per cu. ft. at 180°. There are two different ways of curtailing the time required to reach a temperature of 210° (usually 1 to 1½ but up to 5 hours), viz., decreasing the depth of the soil, which would necessitate a readjustment of the electrodes, or treating the soil with a light application (0·025 to 0·05 per cent.) of ammonium sulphate or potassium chloride.

Several makes of soil sterilizer using heating elements are available with capacities ranging from ⅓ to 1 cu. yd., demands from 1,250 to 5,000 kw., and prices from $85 to 135. Tests have been made on two such sterilizers with the minimum and maximum capacities and demands. After nine hours' working, the latter was found to have used 45 kw. hours and the minimum and maximum temperatures were 158° and over 300°, respectively. After ten hours, the smaller apparatus had used 12·5 kw. hours and the minimum and maximum temperatures were 163° and 298°, respectively.

In tests (with A. L. Pierstorff) on the minimum temperature required to kill the tomato wilt fungus (*Fusarium*) [*bulbigenum* var. *lycopersici*], satisfactory results were obtained at 150° [cf. ibid., xiii, p. 195].

Orton (C. R.). **The dissociation of Fusarium in soil.** – *Bull. Torrey bot. Cl.*, lxii, 7, pp. 413–418, 4 pl., 1935.

The author gives a full account of his studies on the dissociation of *Fusarium* [*bulbigenum* var.] *niveum*, the cause of watermelon wilt, in the soil, an abstract of which has already been noticed from another source [*R.A.M.*, xiv, p. 420; cf. also ibid., xiii, p. 560]. Besides *F. bulbigenum* var. *niveum*, the author also studied three strains of *F. vasinfectum* from cotton, and one of *F.* [*bulbigenum* var.] *tracheiphilum*. The last-named exhibited no dissociation throughout the experiments, the same also applying to two strains of *F. vasinfectum*, a third strain of which, however, produced two distinct dissociants.

Killian (C.) & Fehér (D.). **Recherches sur phénomènes microbiologiques des sols sahariens.** [Studies on the microbiological phenomena of Saharan soils.] – *Ann. Inst. Pasteur*, lv, 5, pp. 573–622, 13 figs., 8 graphs, 1 map, 1935.

An exhaustive, fully tabulated account is given of the writers' studies on the microbiology of Saharan soils in the vicinity of the Laboratory of Desert Biology at Beni-Ounif. Among the organisms isolated were the

following: eight species of *Actinomyces*, including *A. cellulosae* [*R.A.M.*, xiv, p. 698] and three new ones, *Mucor brevipes*, *M. mucedo*, *M. racemosus* [ibid., xiv, pp. 247, 655], *M. spinosus*, *Rhizopus nigricans*, *R. microsporus*, *Thamnidium elegans*, *Cephalosporium acremonium* [see above, p. 220], *Trichoderma lignorum*, *T. koningii* [ibid., xiv, p. 551], *Aspergillus candidus*, *A. flavus*, *A. fumigatus*, *A. niger*, *A. phaeocephalus*, *A. variabilis*, *Penicillium candidum*, *P. crustaceum*, *P. silvaticum*, *Sporotrichum laxum*, *S. luteo-album*, *S. polysporum*, *Trichothecium roseum*, *Periconia atra*, *P. ellipsospora*, *Trichosporium fuscum*, *Haplographium chlorocephalum*, *Helminthosporium folliculatum*, and *Macrosporium commune* [*?Pleospora herbarum*].

Notwithstanding the minimal water content of the desert soils and the excessively high temperatures to which they are exposed, the fungi and other micro-organisms contained therein were shown by respiration experiments to be in a state of full activity. It should therefore be possible, by irrigation and other cultural measures, to dispense with the costly synthetic fertilizers hitherto deemed essential in these regions, more especially as the phosphorus and (in general) the potash contents were found to be amply sufficient for the normal requirements of cultivation.

Salmon (E. S.) & Ware (W. M.). **The chlorotic disease of the Hop. IV. Transmission by seed.**—*Ann. appl. Biol.*, xxii, 4, pp. 728–730, 1 pl., 1935.

The authors consider that the transmission through the seed of the chlorotic disease of the hop [*R.A.M.*, xii, p. 242] was demonstrated by their experiments, in which hop seeds collected in 1932 from naturally diseased plants were sown early next year in seed-boxes. Of the 228 hop seedlings thus raised, 28 (12·3 per cent.) showed the disease in June, 1933, and among the remaining 196 apparently healthy plants (four plants were discarded), 33 (16·8 per cent.) developed the chlorotic disease in 1934. Thus a total of 61 plants (26·8 per cent.) eventually showed chlorotic symptoms.

Salgues (R.). **Les modifications biochimiques en phytopathologie. L'essence de lavande officinale des plantes parasitées par Septoria lavandulae Desm.** [Biochemical modifications in phytopathology. Pharmaceutical essence of Lavender from plants parasitized by *Septoria lavandulae* Desm.]—*C. R. Soc. Biol., Paris*, cxx, 35, pp. 703–704, 1935.

Chemical analyses were made of the oil produced by lavender plants attacked by *Septoria lavandulae* [*R.A.M.*, v, p. 278], the agent of irregularly circular, white, red-bordered, prominent foliar lesions, and of that from healthy individuals on four different soil types in Var and in the Lower Alps (France). It was found that the diseased plants on all the soils produced considerable less oil with a somewhat higher specific gravity and rotatory capacity than the healthy ones; the essence from the former was further found to contain a very low proportion of terpenic alcohols, the place of which was taken by abnormally large quantities of cineol.

Canonaco (A.). **Una batteriosi del Fieno Greco 'Trigonella foenum graecum' L.** [A bacteriosis of Fenugreek '*Trigonella foenum-graecum*' L.]—*Riv. Pat. veg.*, xxv, 9–10, pp. 373–377, 1935.

In February, 1935, the author examined wilted *Trigonella foenum-graecum* plants from a field where all the plants had been destroyed by the disease. The roots were healthy, but the stems bore yellowish to olivaceous lesions varying in length from only 2 to 3 mm. up to the whole length of one side. The affected epidermis was readily detachable and the cells, which were almost completely broken down, contained numerous bacteria; in some cases the bacteria were present in cavities in the underlying tissue. They were motile, rod-shaped, Gram-negative, aerobic, non-sporulating, isolated or arranged in chains of two or three, generally had one polar flagellum, and measured 1·5 to 2·5 by 0·8 to 1 μ. The creamy-white colonies grew slowly and had a wavy margin. The organism was slightly fluorescent, did not reduce nitrates, coagulated milk, produced ammonia but not indol, and grew best at 26° to 28° C. From these characters, the appearance of the lesions, and the nature of the host the author identifies it as *Bacterium medicaginis* [*R.A.M.*, xiv, p. 140]. Inoculations of healthy young wounded and unwounded *T. foenum-graecum* plants by watering with the culture liquid gave negative results, and it is considered that the original infections had been favoured by predisposing factors.

D'Emmerez de Charmoy (D.). **La lutte contre la mosaïque de la Canne à sucre à l'Île de la Réunion.** [Control of Sugar-Cane mosaic in the island of Réunion.]—*Rev. agric. Maurice, 1935*, 83, pp. 158–163, 1935.

As a result of replanting the most severely affected areas with the P.O.J. 2878 and Co. 213, 214, 281, and 290 sugar-cane varieties, mosaic is reported to be declining in Réunion [cf. *R.A.M.*, xiii, p. 59].

Fawcett (G. L.). **Clava para la determinación de las variedades de Caña de Azúcar cultivadas en Tucumán.** [A key for the determination of the Sugar-Cane varieties cultivated in Tucumán.]—*Circ. Estác. exp. agríc. Tucumán* 44, pp. 81–94, 2 figs., 1935.

Among the characters included in this key (replacing *Circ.* 36 in the same series) for the determination of the sugar-cane varieties cultivated in Tucumán is their reaction to mosaic [*R.A.M.*, xii, p. 786]. Purple varieties immune from the disease include Tejp 24, and ten indigenous types, while among those contracting infection are B. 1376, Cheribon, Co. 281, D. 1135, P.O.J. 33, 213, 501, 826, 1228, 1547, and 2379, and five local sorts. Seventeen local varieties with green shoots, as well as Agaul, Kavangire, Oshima, P.O.J. 2725 and 2878, Yon Tan San, and Zwinga are immune from mosaic, which is found, however, on the following green varieties: India, ten P.O.J. selections, P.W.D. 38, 369 B, and one indigenous type. Of the mixed purple and green varieties, Kassoer, P.O.J. 2714 and 2883, and six local sorts are free from mosaic, while the disease affects F. 19 and P.O.J. 36, 161, 228, and 1419. Partial infection is contracted by Co. 213 (yellow), Co. 223, 272, and 284 (purple), Co. 270 (green), Co. 290 (grey), and a local purple type.

Adams (J.). **Some fungi from Anticosti Island and Gaspé Peninsula.**—*Canad. Field Nat.*, xlix, 6, pp. 107–108, 1935.

Among the fungi collected during visits to Anticosti Island and the Gaspé Peninsula, Canada, in 1933 and 1934 were *Plowrightia morbosa* [*Dibotryon morbosum*] on *Prunus* sp. [*R.A.M.*, xiv, p. 772], *Rhytisma salicinum* on *Salix candida* [ibid., xi, p. 157], *Chrysomyxa ledicola* on *Picea canadensis* [ibid., xii, p. 799], *Cronartium ribicola* on *Ribes* sp., *Melampsorella elatina* forming witches' brooms on *Abies balsamea* [ibid., vi, p. 450], and *Pucciniastrum americanum* on *Rubus strigosus* [ibid., xii, p. 104].

Kern (F. D.) & Toro (R. A.). **Notes on some fungi from Colombia.**—*Mycologia*, xxvii, 6, pp. 615–617, 1935.

This is a briefly annotated list of nine species of fungi, mostly rusts, which were collected by the authors in 1934 in Colombia, including *Cerotelium desmium* [*R.A.M.*, xi, p. 475] on cotton (*Gossypium peruvianum*).

Cummins (G. B.). **Notes on some species of the Uredinales.**—*Mycologia*, xxvii, 6, pp. 605–614, 1 pl., 4 figs., 1935.

The examination by the author of two herbarium specimens of a rust on yam (*Dioscorea alata*) from the Philippine Islands and Samoa, showed that the uredospores of both agree well with Raciborski's description, in 1910, of *Uredo dioscoreae-alatae*. The fungus was first described in 1875 by Berkeley and Broome as *Aecidium dioscoreae*, and was transferred in 1912 to the genus *Uredo* by Petch, who stated that it was apparently identical with *U. dioscoreae-alatae*; this transfer was not valid, since Henning had previously used the name for another species. The teleutospores of the fungus are embedded in a gelatinous matrix which, on the rupture of the epidermis, protrudes as a hyaline umbo; they are cylindrical, straight or more or less sinuous, smooth, hyaline, 8 to 10 by 40 to 60 μ, and becoming 4-celled, only the basidiospores being liberated above the surface of the matrix. These characters correspond closely to those of the genus *Goplana*, as described by Raciborski, and the rust is accordingly renamed *G. dioscoreae* (Berk. & Br.) comb. nov., with all the other names, except *U. dioscoreae* Henn., as synonyms.

Notes are also given in this paper on four other rusts, including one new species.

Rostrup (O.). **Bidrag til Danmarks svampeflora. II.** [A contribution to the fungus flora of Denmark. II.]—*Dansk bot. Ark.*, viii, 8, 60 pp., 13 figs., 1935. [English summary.]

This second annotated list (the first appeared in 1916) of Danish fungi collected by the late O. Rostrup is preceded by a biographical sketch of the well-known mycologist by C. Ferdinandsen and supplemented by an alphabetical index to both parts prepared by N. F. Buchwald. The present contribution comprises 827 species, of which 364 are new records for the country. Among the comparatively few fungi of phytopathological interest, *Gloeosporium umbrinellum* may be

mentioned as causing the partial defoliation of young oak trees, resulting in rather severe damage.

SĂVULESCU (T.) & SANDU-VILLE (C.). **Beitrag zur Kenntnis der Micromyceten Rumäniens.** [A contribution to the knowledge of the Micromycetes of Rumania.]—*Hedwigia*, lxxv, 3, pp. 159–192; 4, pp. 193–233, 1935.

In this third contribution to the mycoflora of Rumania [cf. *R.A.M.*, x, p. 691], the writers enumerate a further 237 species of Micromycetes, bringing the total for the country to 579. Thirty species and varieties in the present list are new and accompanied by Latin diagnoses. Branches of apple were infected by *Dermatea corticola* Arn. (*Myxosporium corticola*) [*Neofabraea corticola*: ibid., x, p. 272], the conida of which measure 20 to 30 by 6·6 to 8·25 μ. *Diplocarpon soraueri* (Kleb.) Nannf. (*Fabraea maculata* [ibid., xiv, p. 772]), with conidia measuring 7 to 20 by 10 to 13 μ, was observed on quince leaves. The foliage of *Panicum miliaceum* was attacked by *Phyllosticta panici-miliacei* n.sp., with pycnidia 90 to 132 μ in diameter, and numerous rod-shaped, straight or curved spores, rounded at both ends, 4 to 5 by 2·2 μ. The symptoms of the maize leaf spot caused by *P. zeae* Stout [ibid., x, p. 305] agree with those reported from the United States; the elliptical or oval spores of the Rumanian material measure 4·4 to 6 by 2·3 to 3 μ (average 5 by 3 μ) compared with 4·5 to 7·5 by 2 to 3·5 μ for the American specimens.

Septoria tomates Speg., differing from *S. lycopersici* and its f. *italica* (stated to be the only European representatives of the genus hitherto known on the tomato) in its much shorter, more slender, sub-sigmoid spores, 36·3 to 59·4 by 1 μ in the writers' material, 30 to 50 by 1 μ in the original diagnosis, was found on tomato leaves. The fungus had previously been reported only from Brazil.

Heterosporium iridis-pumilae n.sp. forms scattered, circular to elliptical, yellowish-brown spots with a purplish-brown margin, becoming shrivelled, 1 to 5, mostly 2 to 4 mm. in diameter, on both sides of *Iris pumila* leaves. The simple, caespitose conidiophores measure 26 to 56 by 6 to 10 μ and the yellow-brown, verruculose, straight, biscuit-shaped, 2- to 3-septate conidia, 26 to 42 by 13 to 16 μ.

Red currant leaves were found to bear amphigenous, irregular, scattered or confluent lesions, 3 to 10, mostly 4 to 5 mm. in diameter, brown to olivaceous on the under, brown with greyish-white tufts on the upper side, with a dark purple or purplish-brown margin, caused by *Cercospora ribis-rubri* n.sp. The fungus is characterized by fasciculate, simple, continuous, erect conidiophores, light brown at the base, subhyaline and bi- to trinodular at the apex, 26·5 to 50 by 4 to 5, mostly 33 to 40 by 5 μ, and by vermicular, slightly curved or flexuous, 2- to 5-, usually 3- to 4-septate, subhyaline to pale brownish conidia, rounded or shortly stipitate at the base, tapering towards the apex, 60 to 115, mostly 66 to 82 μ long and 4 to 5 μ wide at the base (2·5 to 3 μ at the apex). Both in the nature of the lesions induced and in morphological characters the new species differs from *C. ribis* Earle, *C. ribicola* Ell. et Ev. (to which it approximates most closely), and *C. marginalis* Thüm., the other agents of currant leaf spots.

Macrosporium pruni-mahalebi n.sp., forming amphigenous, circular, brown, later yellow to pallid, shrivelled, dark-edged spots, 2 to 6 mm. in diameter, on *Prunus mahaleb* foliage, has simple conidiophores, 128 to 135 by 5 μ, on which are borne brown to fuliginous, oblong to ovoid conidia with a subhyaline pedicel [beak], 26 to 50 by 10 to 14, mostly 33 to 40 by 13·2 μ, with 4 to 10 transverse, and 1 to 2 vertical septa.

Alternaria capsici-annui n.sp. [ibid., xiv, p. 215] forming irregular, grey, greyish-brown, or greyish-black spots, 2 to 6 cm. in diameter, on chilli fruits in association with *Actinomyces todschlidowskii* [loc. cit.], is characterized by simple conidiophores, 40 to 50 by 5 μ, bearing catenulate [ob]clavate, elongated or fusoid, brown or yellowish-brown conidia, 32 to 82 by 7 to 21 μ, with 3 to 7 transverse and 1 to 3 longitudinal septa. The fungus was grown in pure culture on a number of media and inoculation experiments on both the thick and long types of chilli and on 'blau' tomatoes gave positive results (very slow on the latter host), whereas pungent chillies showed a high degree of resistance and green and red tomatoes were immune.

WALLACE (G. B.). **Armillaria root rot in East Africa.**—*E. Afr. agric. J.*, i, 3, pp. 182–192, 5 figs., 1935.

A full account is given in semi-popular terms of *Armillaria mellea* root rot [*R.A.M.*, xiv, p. 678 and above, p. 232], with special reference to East African conditions. After discussing the geographical distribution of the fungus and tabulating its host range in East Africa, the author describes the symptoms of the disease on tea, coffee, and other trees, and records the occurrence of sporophores of the fungus, found growing from dead forest roots in a tea plantation in Tanganyika in July, 1935. The fungus (for which the name *A. mellea* is retained for the present) differed slightly from *A. fuscipes* [ibid., x, p. 525] in having more sporophores (up to 27) in a group, smaller caps (diameter up to 5·5, but usually about 3·5 cm.), and longer stalks (up to 13·5, usually 5 to 8 cm. high); the white, smooth, oval spores measured 6·3 to 9·2 by 4·5 to 6·4 μ.

The dependence of *A. mellea* for part of its parasitic activity on environmental and other factors is discussed, and the paper terminates with notes on measures of control [ibid., xiv, p. 451]. In one coffee plantation in Tanganyika where isolated cases or groups of up to six occurred, control was effected by the removal of infected coffee trees together with contaminating roots, while on a tea estate, those areas where the stumps were all removed before planting have remained almost free from attack, whereas others in which they had to be left are heavily infected.

MCKINNEY (H. H.). **The inhibiting influence of a virus on one of its mutants.**—*Science*, N.S., lxxxii, 2133, pp. 463–464, 1935.

Tobacco plants were inoculated with mixtures of the common (light green) and yellow mosaics in which the extract of the latter was 999 times more concentrated than that of the former [*R.A.M.*, ix, p. 260]. All the plants developed yellow mosaic, but 47 days after inoculation the young leaves were showing common mosaic symptoms. In other

plants simultaneously inoculated with mixtures containing 499 and 99 parts, respectively, of yellow mosaic extract, yellow mosaic symptoms also developed but were followed by those of ordinary mosaic more rapidly than in the foregoing series.

Tobacco plants with yellow mosaic were reinoculated with a highly purified virus of common mosaic [ibid., xv, p. 177]. In from 5 to 20 leaves subsequently produced yellow mosaic symptoms were apparent, in the next 8 to 25 they were largely replaced by those of common mosaic, while the latter alone were observed in the foliage developing later. The yellow mosaic virus was present only in small amounts, chiefly in the first few leaves.

Regarded from the standpoint of 'acquired' or 'induced' immunity [ibid., xiv, pp. 388, 600, 812], the common mosaic virus may be interpreted as an immunizing agent or 'vaccine', and from the evidence here adduced a state of incompatibility exists between it and the yellow mosaic virus, involving the ultimate suppression of the latter by the 'vaccine' virus in the meristematic tissues. In so far as the disease induced by the common mosaic vaccine assumes a permanent and severe form, this immunizing agent must be ranked in a low or primitive category. On the other hand, however, it is entitled to high rank as inhibiting and to a large extent curing the disease caused by the yellow mosaic. The *G* virus used in Salaman's tests against the *L* virus in tobacco and *Datura stramonium* [ibid., xii, p. 581] is an even more efficient vaccine, inducing very slight symptoms with no appreciable effect on the health of the plants.

The inhibitory action of the common mosaic virus is regarded as convincing evidence that the occasional small yellow mosaic spots consistently associated with common mosaic in upwards of 5,000 tobacco plants examined by the writer arose as mutants in the diseased tissues and not from an external source. The scarcity of plants with pure yellow mosaic in commercial tobacco and tomato fields is now explicable as due to the restriction of this virus by that of common mosaic, the proportion of the latter entering and becoming established in the plants far exceeding that of the former.

JOHNSON (F. H.). **Cultural studies on the virus of Tobacco mosaic.**—*Phytopathology*, xxv, 11, pp. 1035–1037, 1935.

Details are given of the writer's experiments to culture the tobacco mosaic virus [see preceding abstract] *in vitro*. A given amount of sap (usually 9·9 c.c.) from the ground or unground leaves of healthy tobacco plants was inoculated with a specified quantity (generally 0·1 c.c.) of sap from mosaic plants rendered bacteria-free by passage through a Berkefeld 'W' filter [cf. *R.A.M.*, xiv, p. 722] and incubated for a week at 30° C. The infectivity of the culture was then tested by inoculating tobacco plants and at the same time a subplant was made into another tube of the same medium, the process being continued and infectivity tested at each stage through dilutions of 1:1,000,000. The original inoculum was never found to be infectious at a dilution exceeding 1:100. Attempts to obtain an enhanced degree of virulence by variations in the method of procedure gave negative results, except in one instance, which was not experimentally repeated.

Johnson (E. M.) & Valleau (W. D.). **Cultural variations of Thielaviopsis basicola.**—*Phytopathology*, xxv, 11, pp. 1011–1018, 2 figs., 1935.

Observations are made on the differences observed between eleven cultures of *Thielaviopsis basicola* isolated from White Burley tobacco [*R.A.M.*, xv, p. 61] in Kentucky and grown on potato dextrose agar. Two of the cultures from one locality were dark olive, with a deep greyish-olive, powdery mycelium, forming concentric rings, while the others were of various shades of olive and brown. Some produced almost exclusively endoconidia, others predominantly (and one only) chlamydospores. The variants are believed to have originated during the first fortnight of growth in test tubes, becoming more conspicuous on the transference of the cultures to Petri dishes. Single endoconidium cultures from the foregoing differed among themselves and were also unstable in culture, while monospore cultures of monospore cultures were as unstable as the original isolants and the monospore cultures whence they came. An albino culture, forming both endoconidia and chlamydospores, developed as a sector in one dish; no colour was produced after four years' subculturing. Seven monospore cultures of the albino were also white and formed both types of spores. In pathogenicity tests on White Burley tobacco the albino culture appeared to be slightly more virulent than the remainder, between which little difference in this respect was observed. Reproductive bodies failed to develop at 27° C. either in old cultures or in dishes containing two or more intermingling monospore cultures from different sources.

Mes (Margaretha G.). **Some observations on leafspots of Tobacco caused by phosphorus deficiency.**—*S. Afr. J. Sci.*, xxxii, pp. 246–256, 1935.

Further studies on Maryland and Brazilian tobacco plants grown in water cultures deficient in phosphorus and supplied with increasing concentrations of iron tartrate [*R.A.M.*, ix, p. 414] showed that on light green leaves the spots formed are white and closely resemble those of 'pock disease' in the Dutch East Indies [ibid., xi, p. 333.] On the darker foliage the reddish-brown spots are reminiscent of a disorder of obscure origin known as 'red rust' in South Africa [ibid., x, p. 585]. Between these two extremes various transitional forms may be observed.

Symptoms of boron deficiency, including dying-off at the tips and growing points, blackening of the axillary buds, shedding of the flowers and fruit, and downward curling of the leaves, were cured by the addition of this element to the cultures [cf. ibid., xiii, p. 659].

Smith (K. M.). **A new virus disease of the Tomato.**—*Ann. appl. Biol.*, xxii, 4, pp. 731–741, 3 pl., 1935.

This is an account of the author's studies of the tomato virus disease recently described by him as new [*R.A.M.*, xiv, p. 724; xv, p. 180], the results of which showed that it is readily sap-transmissible, one of its characteristics being its extremely short incubation period in certain host plants. At a mean daily temperature of 60° to 70° F., in tobacco

(White Burley) and *Nicotiana langsdorffii* leaves it causes local lesions three days after inoculation, in the form of small, red spots surrounded by a yellowish halo, which rapidly dry out; infection does not become systemic in the proper sense of the word, but about one-tenth of the inoculated tobacco plants may develop a few scattered lesions on uninoculated leaves. On *N. glutinosa* small, round local lesions are formed on the inoculated leaves in about 48 hours, which gradually increase considerably in size (sometimes up to 5 mm. in diameter), but usually no further development of the disease takes place. *Datura stramonium* and cowpea (*Vigna sinensis*) are valuable differential hosts for this virus; on the former it causes circular or dendritic yellow spots on the inoculated leaves in about five days, and systemic infection develops normally; the disease is very severe, and is characterized by a very bold, yellow and green variegation and a severe blistering and deformation of the leaves, with occasionally a stem lesion. On the cowpea small lesions, with deep red edges and pale centres, develop in three to four days; they are at first pale, but rapidly turn red and increase in size; systemic spread of the virus in this host has not been observed. Local infections have also been obtained on a few other unrelated plants.

The virus loses its viability fairly rapidly in extracted sap at room temperature but showed no apparent reduction in concentration after storage for 28 days at 1° C.; it withstood 10 minutes' immersion in hot water at 78° but was inactivated at 80°, and in one instance it tolerated 95 per cent. alcohol for 24 hours; it appeared to be unable to withstand desiccation, and infection was rarely obtained at dilutions greater than 1 in 10,000 with crude expressed sap. Filtration through gradocol membranes showed that the approximate particle size of the virus is 25 to 27 $\mu\mu$. The disease was not reproduced in tomato seedlings raised from the seed from mottled tomato fruits, indicating that seed transmission, if it occurs, is not frequent. It was also shown that previous infection of plants with tobacco virus 1, tobacco ring spot, and tomato spotted wilt did not confer immunity from infection with the new virus, indicating by analogy that the latter is entirely distinct from the other viruses.

AINSWORTH (G. C.). **Another new virus disease of Tomato.**—*Gdnrs' Chron.*, xcviii, 2549, p. 320, 2 figs. (1 on p. 321), 1935.

Three further cases of the new virus disease of tomatoes recently described by K. M. Smith, characterized by severe stunting of the plant and yellow spotting and discoloration of the leaves [see preceding abstract], were received at the Cheshunt Experimental Station during March and April, 1935, and another instance was recorded from Northern Ireland in May.

In the present note the symptoms of yet another apparently new virus disease of the same host are described. The plants, which originated in a commercial nursery at Waltham Abbey, Herts., bore on the underside of the leaflets interveinal leafy outgrowths or enations ranging in size from inconspicuous ridges or shallow frills to well-developed, leaf-like structures $\frac{1}{4}$ in. across [cf. *R.A.M.*, xv, p. 181]. The affected leaflets are usually somewhat narrowed and misshapen like those suffering from 'fern leaf', a condition further recalled by the

filiform appearance of the leaves without enations. In addition to the distortions the foliage, especially near the top of the plant, shows a mottling similar to that of tomato mosaic.

The disease was found to be readily transmissible to healthy plants by mechanical inoculation with the juice from infected ones, and enations developed on all the test plants after two to three weeks. The virus was ascertained to be a strain of the ordinary tomato mosaic, with which it agrees in its rapid spread from plant to plant during pruning operations and further in its capacity for survival in dead plant material. Smoking tobacco is liable to infection by this strain of tomato mosaic, which may thus be introduced into a crop by a workman handling the plants with fingers contaminated from a cigarette.

WAGER (V. A.). **Brown rot of Tomato fruits due to Phytophthora parasitica Dast.**—*S. Afr. J. Sci.*, xxxii, pp. 235–237, 1935.

Tomatoes in the eastern Transvaal were destructively attacked in 1934 by a disease locally known as brown rot, the first symptom of which is a small, brown spot, rapidly enlarging in the form of concentric, olive-brown rings and spreading through the interior of the fruit, causing a soft, malodorous rot. The decay has subsequently been observed on tomatoes on the Highveld.

The fungus isolated from the rotted material was characterized by oogonia measuring 21 to 30 μ (average 27·3 μ), oospores 18 to 27 μ (21·6 μ), amphigynous antheridia 12 μ, chlamydospores 16·2 to 32·4 μ (27 μ), papillate sporangia 31·9 to 54·6 by 27·3 to 37·8 μ (average 43·7 by 32·8 μ), and spores 11 to 13 by 6 to 9 μ. It was identified by S. F. Ashby as *Phytophthora parasitica* [*R.A.M.*, xiv, p. 263]. Inoculation experiments on wounded green tomatoes with fragments of oatmeal agar cultures of the fungus gave positive results at 25° C. The disease occurs only during the summer months and is favoured by rainy weather. It is more prevalent on fruit exposed to the sun, e.g., through partial defoliation by *Macrosporium* [*Alternaria*] *solani* than on that well provided with dense foliage. *P. parasitica* has also been observed in South Africa on rhubarb [ibid., xi, p. 331] and two succulents, *Cotyledon* sp. and *Trichocaulon* sp.

Suggested control measures are the immersion of the fruit for 1½ minutes in water heated to 60°, spraying with a copper-containing mixture and a good spreader, and staking the plants to avoid infection from zoospores splashed up from the soil.

NIGHTINGALE (ALICE A.) & RAMSEY (G. B.). **Development of Phoma rot of Tomatoes in transit and storage.**—*Circ. U.S. Dept. Agric.*, 371, 8 pp., 1935.

Phoma destructiva [*R.A.M.*, xiv, p. 475] is one of the most important causes of loss of tomatoes in transit and storage in the United States, where, though reported from all the tomato-growing areas, it is most serious in consignments from Florida. In 1934, 16 test crates of disease-free 'mature green' tomatoes wrapped and packed in the usual manner and dispatched from Florida on arrival at Chicago 7 days later showed 33·8 per cent. infected fruits, an average of 2·5 spots per fruit. The lesions ranged from 0·1 to 1·75 cm. in diameter, and about 38 per cent.

had little commercial significance as they were under 0·5 cm. in diameter and the fruits were still marketable; 47 per cent. originated at the stem scar, 41 per cent. in shoulder bruises, and the remainder in other wounds or injuries. Of the lesions 1 cm. or more in diameter 76 per cent. occurred on ripe fruits and the remainder on fruits turning red. Only two lesions over 0·6 cm. in diameter were found on green tomatoes.

The rot developed more rapidly on ripe than on green tomatoes, and at the higher temperature during April and May than in January. Nearly all the spots that developed in storage were already visible after 6 or 7 days' transit, though many of those present at the stem scars would not have been noticed in packing. Fruits apparently unaffected on arrival after 4 or 5 days' transit often bore imperceptible infections which later developed into visible lesions. Pycnidia were formed in the larger lesions on ripe tomatoes but not on green ones, and a few new lesions developed about stem scars or in injured areas as a result of the spread of pycnospores on fruits kept 7 to 20 days in storage. Under ordinary ripening-room conditions there would be little spread of infection from one tomato to another.

Hiroe (I.). **Brachysporiose of plants. IV.**—*Ann. phytopath. Soc. Japan*, v, 2, pp. 121–144, 5 figs., 1935. [Japanese, with English summary.]

The twenty-four strains of *Brachysporium* pathogenic to plants in Japan are stated to be divisible on a morphological, physiological, and pathological basis into six groups, of which I includes seven identical strains occurring, respectively, on rice, pepper (*Capsicum annuum*), a variety of *Echinochloa* [*Panicum*] *crus-galli*, a variety of *Coix lacryma-jobi*, *Cynodon dactylon*, *Alopecurus agrestis* [*A. creticus*], and *Cyperus iria*, and collectively referred to *B.* (*Helminthosporium*) *tomato* [with a revised diagnosis: *R.A.M.*, xiv, p. 344]. The fungus, which occurs on tomato (in the United States), pepper, *Coix*, and rice [see also ibid., xiii, p. 653] fruits, and on the living leaves of rice and other hosts (as well as wheat in inoculation tests) in Japan, produces oblong, subspherical, circular, or irregular, often confluent, chestnut-brown, later fuscous to black lesions, and is characterized by simple, erect, slightly flexuous, 5- to 10-septate conidiophores, 50 to 400 by 4 to 9 μ, with subbulbous, light brown bases, and by solitary, oblong, erect or slightly curved, 1- to 4-, generally tri-septate, yellowish-brown conidia, the outermost cells paler, measuring 10 to 45·6 by 5·6 to 16·8 μ (mostly 18 to 30 by 10 to 12 μ).

All the strains isolated made vigorous growth on apricot decoction agar and synthetic media with peptone and asparagin, forming dark grey, cottony colonies and numerous dark sclerotia; conidial production is most profuse on apricot decoction agar. The optimum temperature for the growth of all strains on Saito's onion soy agar is 32° C., with a maximum at 40°.

Verrall (A. F.) & Graham (T. W.). **The transmission of Ceratostomella ulmi through root grafts.**—*Phytopathology*, xxv, 11, pp. 1039–1040, 1 fig., 1935.

In the course of investigations on the Dutch elm disease (*Ceratostomella ulmi*) in the United States [*R.A.M.*, xv, p. 184], the occurrence

of root grafts, involving complete vascular union between the trees, was found to be common. In 1935 twelve diseased trees were found grafted to the roots of stumps known to have been diseased and removed in the 1934 control operations. The discoloration, from which the fungus was isolated, was traced in each case from the stump, through the grafted roots, and into the stem of the adjacent tree. In five of the trees the symptoms were present in the grafted roots, collar, and lower stem but absent from the crown—the ordinary means of entry.

Schimmler (G.). **Rauchschäden an Laub- und Nadelgehölzen.** [Smoke injuries to broad-leaved trees and conifers.]—*Gartenflora*, lxxxiv, 9, pp. 271–272, 1935.

In the industrial centres of Germany, such as the Saar and Ruhr Valleys, Aachen [Aix-la-Chapelle], Saxony, and Upper Silesia, heavy damage is inflicted on hard- and softwoods, shrubs, and the like by the poisonous gases (e.g., sulphur, hydrochloric acid, and fluorine compounds) emanating from factories [*R.A.M.*, xiv, p. 725]. Conifers, especially *Picea excelsa*, have been found particularly susceptible to this form of injury; *Abies nordmanniana*, *P. pungens* and its var. *glauca kosteri* [var. *kosteriana*], *P. engelmanni*, and *P. omorika* are more resistant. Among hardwoods the ash suffers more severely than beeches, oaks, and poplars, while a high degree of resistance is shown by evergreens, such as *Ilex*, *Buxus*, and *Rhododendron*, with their leathery foliage.

The diagnosis of smoke injury presents great difficulties, external symptoms being somewhat deceptive and requiring confirmation by microscopic examination and chemical analysis. The following, however, are indications of gas poisoning: white, yellow, brown, or black discolorations of variable extent of the intercostal areas of hardwood leaves, premature defoliation, desiccation of the crown and branch tips, absence of algae and lichens, a sooty deposit, and (in beeches) a greyish tint on the bark. In conifers the older needles either turn reddish-brown or are shed, their incapacity for complete closure of the stomata exposing them to the full toxicity of the fumes. In consequence of defective assimilation the annual growth increment, measured by the width of the rings, is reduced.

Certain measures may be adopted to minimize the noxious effects of factory gases. Thus, one or more parallel rows of resistant trees may be planted transversely to the direction of the fumes, a method in operation in the 'green belt' surrounding Cologne, where extensive sheets of water also absorb the toxins. The care and nourishment of the trees are also very important. Precautions to prevent the escape of the gases should also be taken by those in charge of the factories. High chimneys merely aggravate the trouble, the fumes often being carried for distances of 6 to 8 km.

Jones (S. G.). **The structure of Lophodermium pinastri (Schrad.) Chev.**—*Ann. Bot., Lond.*, xlix, 196, pp. 699–728, 20 figs., 1935.

A detailed account is given of the author's field and laboratory studies of the infection of pines (*Pinus sylvestris*) in several localities in Wales with *Lophodermium pinastri* [*R.A.M.*, xiv, p. 663], with particular

reference to the cytological details of the process. It is stated that a copious emission of ascospores of the fungus can usually be obtained in early May from fallen pine needles, and that the first visible signs of infection on the living needles are seen usually towards the end of June as small, greyish areas; the colour, however, varies considerably, being sometimes yellow or tinged with purple. The continuous, filiform ascospores, supplied with gelatinous sheaths, and 90 to 140 by 1·5 to 1·7 μ in size, germinate usually from or near the blunt end of the spore, by the production of a short germ-tube, which soon expands into a large, multinucleate vesicle; on artificial media growth is soon arrested, and all attempts to induce the fungus to fructify in culture gave negative results.

Infection of the leaves occurs through the stomata, one or more invading hyphae sending into the guard cells a fine branch which soon forms a small plexus within. In the substomatal space the hyphae become considerably dilated, almost vesicular; the vesicle immediately produces a number of branches which frequently coil around it, the whole body eventually becoming covered with deposits of a black substance. After this the fungus forms rather coarse, yellow hyphae which soon branch into a finer and hyaline type; this mycelium rapidly disintegrates the mesophyll, and eventually reaches the stele, usually through the middle lamellae in the radial cell walls of the endodermis. Once within the stele, the mycelium takes the shortest route to the phloem through the cell walls. The fungus penetrates very few xylem tracheids and was never found in the pitted cells of the transfusion tissue, this fact with the crippling of the guard cells probably accounting for Tubeuf's and Langner's [ibid., xii, p. 604] statements that the transpiration current is more active from diseased than from healthy leaves. The well-known black rings, entirely encircling the leaves, consist of a few layers of dead mesophyll tissue, in which the cell walls are somewhat thickened and heavily impregnated with black pigment. In addition to the shedding of the needles caused by the premature formation of cork layers at the base of the dwarf shoots, defoliation can also be brought about from the deposition of the black substance in the region that would normally form the cork barrier, in which case the fungus is able to reach the stem.

The minute, black, oval pycnidia (which the author considers to be spermogonia) generally appear towards the end of the summer, but the time varies according to the relative humidity [ibid., v, p. 455]. They are laid down at any point within the leaf between the epidermis and hypodermis; as they increase in size a large number of elongated and erect spermatiophores is formed from the hypothecium, from which enormous numbers of bacilliform spermatia, 4 to 8 by 0·5 μ, are abstricted. In some, not all, spermogonia, besides the spermatiophores, a relatively few specialized hyphae are also formed, and are interpreted by the author as perhaps constituting the oogonial and trichogynous parts of a sexual apparatus, though fertilization has not been detected so far. Such spermogonia may eventually become converted into apothecia, while the others dry out. Most of the apothecia, however, are formed independently of the spermogonia, and are considered to develop from the intermingling of mycelia, possibly of opposite sexual

strains; they are distinguished from the former by the character of the roof covering, which is described in detail, as well as the development of ascogenous hyphae and the formation and germination of the spores.

MARKWARDT (L. J.) & WILSON (T. R. C.). **Strength and related properties of wood grown in the United States.**—*Tech. Bull. U.S. Dep. Agric.* 479, 99 pp., 3 figs., 22 diags., 14 graphs, 1935.

This highly technical bulletin, supplemented by 21 tables setting forth the statistical data obtained in the course of extensive studies at the Forest Products Laboratory, Madison, Wisconsin, contains some observations on the preservative treatment of wood in relation to its strength and allied properties.

Coal-tar creosote, water-gas tar, wood-tar creosote, creosote-tar, and creosote-petroleum mixtures have been found to be practically inert to wood, on which they exercise no adverse chemical influence, and the same may be said of the 2 to 5 per cent. zinc chloride solutions in common use. However, even with substances harmless in themselves, faulty methods of treatment may seriously impair the strength of the timber, e.g., where green wood is conditioned for injection by steaming or boiling under vacuum at extremely high temperatures or for unduly prolonged periods. A temperature of 259° F. (pressure 20 lb.) should not be exceeded in steam conditioning; the maximum reached in the boiling-under-vacuum process is usually below 210°. Severe end checking and collapse are liable to result from the use of pressures above 175 lb. in the injection of preservatives into woods (especially those of low density) softened by lengthy heating.

Some general information on the conditions predisposing to decay and the means of obviating infection by wood-destroying fungi is also presented [see next abstracts].

Wood handbook. Basic information on wood as a material of construction with data for its use in design and specification.—U.S. Dep. Agric., Washington, D.C., 325 pp., 6 pl., 3 figs., 54 diags., 4 graphs, 3 maps, 1935.

This manual on the technical applications of wood as a building material, prepared by R. F. Luxford, G. W. Trayer, and collaborators, is stated in the foreword to be based chiefly on the accumulated information accruing from engineering and allied investigations conducted at the Forest Products Laboratory, Madison, Wisconsin, during the last twenty years. The sections on protection against wood-destroying organisms (fungi on pp. 249–253) and wood preservation (pp. 263–282) by C. Audrey Richards and G. M. Hunt, respectively, contain useful information in a condensed form on the etiology of decay in timber and its control by up-to-date methods of treatment [see preceding and next abstracts.]

MACLEAN (J. D.). **Manual on preservative treatment of wood by pressure.**—*Misc. Publ. U.S. Dep. Agric.* 224, 123 pp., 3 figs., 3 diags., 29 graphs, 1935.

The purpose of this valuable manual is stated in an introductory note to be a discussion of the application of the results obtained in extensive

theoretical and practical researches at the Forest Products Laboratory, Wisconsin, on the technical problems surrounding the pressure treatment of wood to the improvement of this process, besides presenting a summary of the available information on the subject [cf. preceding abstracts]. The work is divided into the following sections: wood preservatives, effect of wood structure on treatment, moisture content, specific gravity, and air space in wood, preparation of timber for treatment, injecting preservatives, absorption and penetration, effect of treatment on the physical condition of the wood, 'bleeding' of treated wood [*R.A.M.*, xiv, p. 205], treating conditions used in commercial practice, specifications for treatment, and formulae for computing (*a*) relation of moisture content, specific gravity, and air space in wood, and (*b*) temperatures in timbers under given conditions.

DEMERE (C.). **Preservatives and antitermite protection of timber.**—*Industr. Engng Chem.*, xxvii, 11, pp. 1303–1305, 1 fig., 1935.

Three types of wood preservatives, known as the Bruce Preservatives 5–A, 5–B, and 5–C, have been developed by the E. L. Bruce Company, Memphis, Tennessee, to meet the various needs of the building industry. Among the fourteen requirements to which these preparations are stated to conform are a high degree of toxicity to wood-destroying fungi and insects, resistance to leaching, non-volatility, absence of properties causing discoloration or other injury to the wood and corrosion of metal, non-inflammability, non-toxicity to human beings, and availability to the trade at a competitive economic level.

Preservative 5–A consists of β-naphthol [*R.A.M.*, xiii, p. 790] in solution in a combination of two grades of black fuel oil and imparts a dark brown colour to the wood, thus disposing of the need for painting outside surfaces. A colourless, rapidly evaporating petroleum distillate is used as a carrier in 5–B (a preparation patented by the Fire Underwriter's Laboratories), which may be glued and painted and is generally well adapted for domestic use. Preservative 5–C resembles 5–B but contains a certain amount of asphalt which acts as a colouring agent and moisture-resistant sealer. It has been widely used during the last four years in the construction of motor-car bodies.

The timber is heated to 190° F. under controlled humidity conditions, thereby expelling 90 to 95 galls. of air from 1,000 bd. ft. of wood, and immersed in the preservative long enough for the absorption of some 35 galls. per 1,000 ft., involving the cooling of the timber to about 120° F. in the tank. This amount of preservative contains some twenty times as much of the toxic principle as is necessary to repel fungal and insect attacks, and in common practice the admission of 20 to 30 galls. suffices. On the removal of the wood from the tank, penetration continues for a time owing to further contraction of the air within; during this process the timber dries rapidly and is very shortly ready for use.

SCHMID (W.). **Ueber Verpilzung von Feuchtholzschliff.** [On the fungal infection of groundwood pulp.]—*Papierfabrikant*, xxxiii, 46, pp. 380–382; 47, pp. 387–389, 1935.

The writer reviews some recent outstanding contributions, chiefly from the Scandinavian literature, to the prevention of blue moulds

(*Cadophora fastigiata, Lecythophora lignicola, Pullularia pullulans, Trichosporium heteromorphum* [and *Ceratostomella* or *Ophiostoma* spp.]) in groundwood pulp in the open and closed grinding systems [*R.A.M.*, xiv, p. 545].

Rennerfelt (*Svensk Trävaru Tidn.*, li, p. 680, 1935) has drawn attention to the increased susceptibility to infection of frozen wood on thawing, a fact that accounts for the extensive damage from blue mould in the far north, where autumn- and winter-felled timber frequently lies in the open for months awaiting transport.

The possibilities of chemical control of fungus infection of pulp are limited by economic considerations. In Swedish mills the maximum outlay authorized for this object is 25 öre [3¼d.] per ton. Chloramine has given conflicting results, but a satisfactory report on its cheapness and efficacy in a Finnish paper factory has been given by Monnberg (*Papp. Trävarutidskr.* Finl., xv, p. 900, 1933). The following method has been patented in Norway. A mixture of 90 to 95 per cent. (by weight) of chlornaphthalene and 5 to 10 per cent. mercury acetate is heated until the bulk of the acetic acid has evaporated, and the resultant transparent liquid is sprayed, in the form either of an emulsion or solution, over the pulp or cellulose at the rate of 10 to 100 gm. per ton. Attempts are stated to be in progress in Sweden to cultivate on a large scale, for incorporation in the grinding water, certain yeast-like organisms exerting an antagonistic effect on the agents of blueing.

Bugnicourt (F.). **Contribution à l'étude du Sphaerostilbe repens B. et Br.** [A contribution to the study of *Sphaerostilbe repens* B. & Br.]—*Bull. écon. Indochine*, xxxviii, pp. 471–477, 2 pl., 1935.

Continuing his investigations on the parasitism of *Sphaerostilbe repens* on *Aleurites montana* in Indo-China [a preliminary note on which has already appeared: *R.A.M.*, xiv, p. 480], the writer has detected the fungus on the root system and collar, the latter, together with the base of the trunk, showing fissures and a depression of the cortex consequent on the destruction and desiccation of the underlying tissues. Death supervenes when the necrosis encircles the trunk, disintegrating the cambium and disorganizing the conducting system in such a way as to interrupt the necessary communication between the roots and aerial parts; a few days earlier the leaves may wither and fall, sometimes only on one side of the tree. An examination of the tap- and other roots showed that the cortex was readily detachable and the tissues watery and intersected by black or bluish lines. Branched rhizomorphs were found to be spreading below the cortex and conidia were observed on some of the roots. The desiccated areas of the trunk bore a profusion of *Diplodia* [*Botryodiplodia*] *theobromae* fructifications and the pustules of an undetermined *Fusarium*.

Infection by *S. repens* occurs in well-marked patches and was found to be in no way favoured by the local soil conditions, which are physically and chemically adapted to the cultivation of *Aleurites*. The fungus must be regarded, therefore, as a virulent pathogen, the control of which is likely to present considerable difficulties. Among the measures tentatively proposed for its suppression are the surrounding of the infection foci by trenches 1 m. deep by 0·60 m. wide, the complete

eradication and burning *in situ* of diseased trees, and soil disinfection with lime (1 part to 4 of soil), which quickly raises the temperature sufficiently to kill the fungus, or 1 per cent. commercial formalin, 15 l. per sq. m.

PERSONS (T. D.). **Anthracnose disease of Eggplants.**—Abs. in *Phytopathology*, xxv, 10, p. 967, 1935.

Two fungi were isolated from two distinct types of lesions on eggplant fruits in Mississippi in 1934, one closely resembling *Gloeosporium melongenae* [*R.A.M.*, vii, p. 21] and the other regarded as identical with *Colletotrichum truncatum* [ibid., xiv, p. 416], apparently not hitherto recorded on eggplant. The latter fungus produced on Lima beans [*Phaseolus lunatus*] lesions similar to those caused by the bean fungus.

Destructive Insect and Pest Acts, England. The Fruit Tree Pests (Middlesex) Order of 1935. Dated November 1, 1935.—4 pp., 1935.

As from 1st December, 1935, the Local Authority for the Administrative County of Middlesex is authorized to order the inspection and, if necessary, the treatment of any apple and pear trees in the Petty Sessional Divisions of Spelthorne and Uxbridge for scab [*Venturia inaequalis* and *V. pirina*: *R.A.M.*, xiv, p. 672], brown rots [*Sclerotinia laxa* and *S. fructigena*], and cankers [*Nectria galligena*].

MARCHIONATTO (J. B.). **Argentine Republic: the 'Dirección de Sanidad Vegetal' of the Ministry of Agriculture. Organization and functions.**—*Int. Bull. Pl. Prot.*, ix, 11, pp. 245–248, 1 diag., 1935.

By a Ministerial Resolution, dated 21st January, 1935, the Department of Plant Health (of the Argentine Republic) was separated from the Department of Agricultural Protection and Plant Health and its scope and functions were further defined by a similar Resolution of 8th February, 1935. Included in the investigation services are the Divisions of Phytopathology, Agricultural Zoology, and Analysis and Commercial Classification of Seeds. The inspection services comprise the Divisions of Sanitary Inspection of Plants and the Sanitary Offices for Plant Imports and Exports. There are also an official factory for insecticides and fungicides and a plant quarantine station. The object of the investigation services is to study plant diseases and parasites with a view to their eradication by appropriate treatments, as well as to give practical advice to farmers. The inspection services, besides regulating the entry of plant products into the Republic, are entrusted with the permanent supervision of commerce in orchard, forest, and ornamental plants throughout the country. Phenological data are collected and applied to the practical control of pests and diseases by the Verification and Sanitary Control Services, while the accessory work of the Department includes (*a*) the determination of conditions for the use of insecticides and fungicides (in co-operation with the Insecticide and Fungicide Commission appointed by Decree of 9th November, 1934); (*b*) advisory activities in connexion with the application of the laws and regulations governing the sanitary condition of plants; and (*c*) the collection and registration of phytosanitary legislative measures at home and abroad.